



GREENWOOD
Multi-jurisdictional
Hazards Mitigation Plan
2015

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I. Introduction

The Greenwood County Hazard Mitigation Plan was developed in accordance with the requirements of the Federal Emergency Management Agency (FEMA) Section 322 local hazard mitigation planning regulations as well as additional guidance documents provided by FEMA and the South Carolina Office of Emergency Management. The goal of this plan is to assist Greenwood County in reducing the human and economic costs of natural disasters. This plan provides a comprehensive risk assessment, vulnerability analysis, mitigation strategies, and implementation schedule for the county and each of the municipalities. At the request of the Greenwood County Emergency Management Office and the Greenwood County Council, this plan analyzes both natural and man-made hazards including acts of terrorism.

A. Description of Planning Area

Greenwood County is located in the Upstate of South Carolina. The county is bordered on the north by Abbeville County and Laurens County, on the east by Newberry County and Saluda County, and to the south by McCormick County and Edgefield County. The total land area in Greenwood County is approximately 455 square miles. Greenwood is located approximately 53 miles from Greenville, SC and 74 miles from Columbia, SC. The population of Greenwood County based on the 2015 Census was 69,661, showing an increase of 3,390 over the last decade.

The County contains five incorporated municipalities: **Greenwood (county seat), Ninety Six, Ware Shoals, Hodges, and Troy**, all of which are small cities or towns in rural settings. Greenwood County also contains the following unincorporated communities: Shoals Junction, Cokesbury, Coronaca, Promised Land, Bradley, Verdery, and Kirksey. A majority of the Town of Ware Shoals lies in Greenwood County, but it also covers land in Abbeville and Laurens Counties.

Greenwood County has a continental-type climate, predominantly influenced by air from the west, which has traveled across the central United States. Winters are generally short, with very few days of intense cold. The mean temperature for January is 45 degrees Fahrenheit. Summers are warm, with high humidity and afternoon thunderstorms. The mean temperature during July is 81°F. Precipitation tends to be evenly distributed throughout the year, with an annual average of approximately 48 inches, almost all of that exclusively as rain.

There are an estimated 14,000 structures in the county. Approximately 90% of these buildings are considered residential uses. The County has other amenities including a Courthouse, schools, fire departments, an emergency communications facility in the Courthouse, and a Sheriff's Office. There are also facilities that store hazardous materials and small dams located in Greenwood County.

- **Greenwood** is located near the center of Greenwood County and is the county seat. It is surrounded by unincorporated and largely undeveloped areas. Greenwood is approximately 13 square miles and has a population of 23,222 making it the largest municipality in the county. Gentle slopes characterize the topography of Greenwood. The largest portion of the City is made up of single-family residential areas. Commercial development in Greenwood is primarily focused in the Central Business District (CBD) and along SC Highway 72 and US Highway 25. Lander University and Piedmont Technical College are located in Greenwood.
- **Ninety Six** is situated approximately five miles west of Greenwood. According to the 2010 Census the population of Ninety Six is 1,998. The town is approximately 1 square miles in area and is surrounded by agricultural or undeveloped land.
- **Hodges** is located north of Greenwood. It is less than 1 square mile in area and has a population of 155. Hodges is a residential community surrounded by farmlands.
- **Ware Shoals** is situated approximately twelve miles north of Greenwood. According to the 2010 Census the population of Ware Shoals is 2,170. The town is approximately 3 square miles in area and is surrounded by agricultural or undeveloped land.
- **Troy** is located approximately 15 miles south of Greenwood. It is less than 1 square mile in area and has a population of 93, making it the smallest municipality in the County. Troy is a residential community surrounded by farmlands.

II. Adoption Process and Documentation

The Greenwood County Hazard Mitigation Plan will be developed as a county-wide plan; therefore, to meet the requirements of Section 322 the final plan will be adopted by County Council.

Sample Hazard Mitigation Plan Adoption Resolution

Resolution # _____

Adopting the Greenwood Multi-jurisdictional Hazard Mitigation Plan

Whereas, (name of county or community) recognizes the threat that natural hazards pose to people and property; and

Whereas, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

Whereas, an adopted all hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

Whereas, (name of county or community) participated jointly in the planning process with the other local units of government within the County to prepare an Hazard Mitigation Plan;

Now, therefore, be it resolved, that the (name of board or council), hereby adopts the Greenwood County Hazard Mitigation Plan as an official plan; and

Be it further resolved, that Greenwood County will submit on behalf of the participating municipalities the adopted Hazard Mitigation Plan to Federal Emergency Management Agency officials for final review and approval.

Passed: _____ (date) _____

Certifying Official

III. Planning Process

The planning process utilized in Greenwood County was based on the Section 322 local planning requirements of the Disaster Mitigation Act of 2000 and supporting guidance documents developed by FEMA and the South Carolina Emergency Management Division. The planning process included the following steps, which will be described in greater detail throughout the plan:

- Step 1: Establish a Mitigation Planning Committee
- Step 2: Conduct the Risk Assessment
- Step 3: Develop Capabilities Assessment
- Step 4: Create Mitigation Plan
- Step 5: Adopt and Implement Plan

This process was led by the Greenwood County Hazard Mitigation Planning Committee members and supported by Upper Savannah Council of Governments staff.

A. Greenwood County Hazard Mitigation Plan

The activities undertaken by Greenwood County are all overseen by the steering committee, which is made up of county, municipal, regional, and private entity representatives as described in the table below.

Table 1. Greenwood County Hazard Mitigation Committee Membership

Name	Organization
George McKinney	Greenwood County Emergency Management Coordinator
Derek Kinney	Greenwood County Emergency Services Director
Toby Chappell	Greenwood County Manager
Charlie Barrineau	City of Greenwood Manager
Arvest Turner	Town of Ninety Six Mayor
John Hansen	Town of Ware Shoals Mayor
Rick Green	Upper Savannah COG Government Services Director
Denise Manley	United Way Executive Director
Beth Marett	American Red Cross Greenwood County Representative
Faye Sprouse	Greenwood County School District 51 Superintendent
Gerald Witt	Greenwood County School District 50 Assistant Superintendent
Wallace Hall	Greenwood County School District 52 Director of Special Services
Ryan Balentine	South Carolina Department of Transportation Maintenance Engineer

Upper Savannah COG assists the county in various planning efforts and was available to convene and facilitate the meetings, consult with the local emergency preparedness professionals, and pull the entire document together in the end for public review and comment.

B. Risk Assessment and Mitigation Planning

One of the early acts of the Greenwood County was to create a Risk Assessment and Mitigation Plan to examine the community's risks and vulnerabilities to natural and man-made hazards. This plan comprised data from federal, county, municipal, and private sources.

Risk Assessment and Mitigation Planning Committee Membership

The Hazard Mitigation Planning Committee was tasked with most of the activities related to the development of this plan and was considered the Core Planning Team. Committee members have worked throughout the process from the initial meeting to the development of the plan.

The committee reviewed the following existing plans and technical information before and during the update process: Greenwood County Hazard Mitigation Plan, Greenwood City/County Comprehensive Plan, City/County Zoning Ordinance, City/County Flood Plain Ordinance, weather reports from the National Oceanographic and Atmospheric Administration and various instructional materials from the Federal Emergency Management Agency. Relevant information from these documents was placed at the pertinent location in this updated plan.

The committee decided that they would take the entire existing plan and review it to start the update process. All sections of the plan were reviewed. Members marked up the plan and brought, mailed, emailed, or discussed those proposed changes with the plan coordinator. The goal section was reviewed to determine which goals had been accomplished, which goals still needed to be accomplished, and which goals were no longer relevant. Updated Census information was used where available and appropriate to make the plan as relevant as possible. Storm and weather events since the last update were also included to determine if there are patterns that are affecting particular areas or populations. All this information was deemed important to having the most complete plan possible for the county.

County and Municipality Participation

County, city, and town participation must be defined in order to create a standard for participation and representation in order for the entities to be considered as participants in the Natural Hazard Mitigation Plan process.

In order for counties to approve the plan and be an official participant of this planning process, they must satisfy the following consideration:

- The county Emergency Management Director is a member of the Hazard Mitigation Planning Committee and provides input and commentary on the planning process.
- In order for cities and towns to be official participants of the planning process, they must satisfy one of the following considerations for representation:
- The mayor, administrator, or manager attended a county or public meeting concerning the Natural Hazard Mitigation Plan and provided input and commentary on the planning process.
- The mayor, administrator, or manager appointed a city or town employee to attend a county or public meeting concerning the Natural Hazard Mitigation Plan and that person provided input and commentary on the planning process.
- The plan coordinator personally discussed the Natural Hazard Mitigation Plan with a mayor, administrator, manager, or appointed municipal representative. The plan coordinator provided the local government representatives the opportunity to review and to comment on the entire plan.

Greenwood County Local Government Participation

Greenwood County
City of Greenwood

Not participating: Towns of Hodges, Troy, Ninety Six, and Ware Shoals – The Towns rely on the County for hazard mitigation activities.

C. Public Involvement

Throughout the process there were opportunities for public input. A meeting was held on September 9, 2014 to kick off the planning process and to describe the overall planning process. Invitation letters to this meeting were mailed to all local governments within Greenwood County, school districts, and utility providers. For those organizations not able to attend, the plan representative called or met with them directly to discuss the planning process and to give them opportunities to comment. Opportunities for comment were also given to the larger non-profits such as the American Red Cross, United Way, and United Center for Community Care, and to institutes of higher learning such as Lander University and Piedmont Technical College.

In addition, a draft of the plan was placed on the Greenwood County website for public comment and review. An email address and the telephone number of the Greenwood County Emergency Management Office were provided with the draft plan to provide a mechanism for the public to provide comments back to plan development facilitators. In addition, all meetings the Hazard Mitigation Planning Committee were open to the public.

Press releases describing the plan and requesting public comment were placed in the Greenwood *Index Journal*, a newspaper available in all participating jurisdictions and on the local news website GwdToday.com on September 22 and 23 of 2014. No comments were received from the public.

In addition the public will be invited to the plan adoption hearing of the Greenwood County Council. A public notice of the adoption hearing will be posted.

After the plan is approved, public involvement will continue through regular presentations by the Emergency Preparedness Director and staff. The plan will be placed on the Greenwood County website after approval for ongoing comment, and all plan update and maintenance meetings will be made public.

Activity Timetable

Greenwood County staff and COG staff meet to discuss process	August 2014
Meeting notices distributed	Sept. 1, 2014
Kick off meeting for plan update	Sept. 9, 2014
Online notice for public comment	Sept. 22, 2014
Plan Update Process	Oct. – Nov.
Submittal of plan for initial review by SCEMD	Dec. 8, 2014

IV. Risk Assessment

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural or man-made hazards. The results of this risk assessment assist Greenwood County and its incorporated municipalities in identifying and understanding their risks from natural and man-made hazards. This information also serves as the foundation for the development of the mitigation plan and strategies to help reduce risks from future hazard events.

The Hazard Mitigation Planning Committee reviewed the following existing plans and technical information before and during the update process for the risk assessment section: Greenwood County Hazard Mitigation Plan, Greenwood City/County Comprehensive Plan, City/County Zoning Ordinance, City/County Flood Plain Ordinance, weather reports from the National Oceanographic and Atmospheric Administration and various instructional materials from the Federal Emergency Management Agency. Relevant information from these documents was placed at the pertinent location in this updated plan.

The committee decided that they would take the entire existing plan and review it to start the update process. Members marked up the plan and brought, mailed, emailed, or discussed those proposed changes with the plan coordinator. The goal section was reviewed to determine which goals had been accomplished, which goals still needed to be accomplished, and which goals were no longer relevant. Storm and weather events since the last update were also included to determine if there are patterns that are affecting particular areas or populations. All this information was deemed important to having the most complete plan possible for the county.

This risk assessment followed the methodology described in the FEMA publication 386-2 “Understanding Your Risks – Identifying Hazards and Estimating Losses” and was based on a four-step process: 1) Identify Hazards, 2) Profile Hazard Events, 3) Inventory Assets, and 4) Estimate Losses. Using FEMA guidance, as well as the Section 322 regulations for developing local hazard mitigation plans EK has developed a risk assessment that identifies:

- The hazards to which the county and its communities are susceptible.
- The impact of these hazards on physical, social, and economic assets.
- The areas within the county most vulnerable to these hazards.
- The potential costs of damages or costs avoided through future mitigation projects.

V. Hazard Events

The first step in the risk assessment process was to identify each of the hazards that can occur within Greenwood County and its incorporated municipalities. This hazard identification process began with a review of previous hazard events based on historical data provided by the Greenwood County Emergency Preparedness Director and the Greenwood County Hazard Mitigation Plan coordinator. They also conducted a review of existing resources, plans, and reports provided by FEMA, Greenwood County, and other sources to understand the nature and extent of natural and man-made hazards in the county. In addition to these resources they also conducted hazard identification and prioritization exercises with the members of the Core Planning Team. The findings from these steps were utilized to determine the priority hazards for Greenwood County and its municipalities, which will become the focus of the mitigation strategies developed in the remainder of this plan.

1. Hazard History

Past occurrences of hazard events are likely predictors of future events. A review of the hazard history of Greenwood County, therefore, helps to provide a better understanding of what hazards the county is susceptible to. Detailed descriptions of the historic hazard events, including information on losses of life and property, as well as estimated damages are included in the Appendix. Below are summaries of the major events by hazard type based on information that was available during the development of this plan.

Flood

South Carolina has two high-water periods each year, one in December-April caused by winter rains and spring showers, another in the fall when tropical storms may bring additional rain.

Greenwood County has some streams that are subject to flooding during heavy rainfall periods. The majority of these streams have sufficient depth to their banks to prevent flooding that will endanger human lives or real property. The Saluda River, which marks the eastern boundary of Greenwood County has no significant history of flooding in the immediate area due to the dam. While flooding is experienced on many of the streams around the County during heavy rains, there are no recorded cases in recent history of deaths or injuries. There are some low-lying roadways and other areas of the city that flood during heavy rains, such as the 2010 event that is noted below. In this case, approximately 6 feet of rain water flooded a low-lying road in a rural part of the county. The flooding was short-lived and was dissipated within two hours.

Recent Flooding Events

§ August 22, 1996: Flash flooding was reported around the City of Greenwood. No damage or injuries were reported.

§ December 24, 1997: Flash flooding due to 1.5 to 2 inches of rain occurred around Greenwood and Ninety Six. No injuries were reported.

§ February 3, 1998: Flash flooding due to 1.5 to 2 inches of rain occurred in various parts of the County. No damage or injuries were reported.

§ September 22, 2000: Small stream flash flooding occurred in various parts of the County due to 3 to 5 inches of rain. No damage or injuries were reported.

§ September 27, 2004: Flash flooding occurred in various parts of the County due to the 3 to 5 inches of rain from the remnants of Hurricane Jeanne. Standing water as high as 3 feet closed a couple of city streets. No damage or injuries were reported.

§ August 3, 2010: Flash flooding due to 3 to 5 inches of rain occurred near the Callison community. Approximately 6 feet of water was noticed at the intersection of Bethel Road and Bowie Road. No damage or injuries were reported.

§ July 9, 2013: Flash flooding due to over 4 inches of rain occurred in central parts of the County. Damage to private property was estimated at \$50,000 but no injuries were reported.

Winter Storm

There were major Southeastern snow storms in 1899, 1914, 1973, 2000, and 2002. Additionally, there have been many more localized winter storms. In January 1968 and February 1979 large ice storms paralyzed the County for several days. More recently in 2002, 2005, and 2007, 2010, 2013, and 2014 ice and snow storms covered the County resulting in power outages and hazardous driving conditions. Greenwood County suffers an average of one to two winter storms each year and a chart is included in the addendum.

Recent Winter Storm Events

§ January 2, 1999: A winter ice storm resulted in road and business closures. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities. Snow was reported in the county in February 1999.

§ January 24 and 29, 2000: Heavy snowfall was reported over most of the state. Greenwood County was part of the Federal Disaster declaration due to ice ¼ to ½ inches thick. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities.

§ January 2, 2002: A winter storm resulted in road and business closures due to accumulations between 2 and 6 inches within the county. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities.

§ December 4, 2002: A winter ice storm resulted in road and business closures due to ice accumulations of ½ to ¾ of an inch. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities.

§ January 26, 2004: A winter ice storm with accumulations of ½ inches resulted in road and business closures. School and government facilities were also forced to close. There were numerous minor injuries due to falls, but no damage to public facilities.

§ February 26, 2004: A winter storm resulted in road and business closures. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities.

§ December 15, 2005: A winter ice storm resulted in business, school and government facilities closing due to power outages. There were no reported injuries and no damage to public facilities.

§ February 1, 2007: A winter storm with accumulations of 1-3 inches of snow, ¼ inch of ice and ½ inch of sleet resulted in road and business closures. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities.

§ February 12, 2010: A winter storm with accumulations of up to 5 inches of snow resulted in road and business closures due to heavy snow. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities.

§ December 25, 2010: A winter storm with accumulations of 1 to 3 inches resulted in road and business closures. Government facilities were also forced to close due to light snow. There were no reported injuries and no damage to public facilities.

§ January 9, 2011: A winter storm with accumulations of 6 to 8 inches of snow and 1/10 inches of ice resulted in road and business closures. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities.

§ February 11, 2014: A winter storm with accumulations of 3 to 4 inches of snow and sleet resulted in road and business closures. School and government facilities were also forced to close. There were no reported injuries and no damage to public facilities.

Tornado

Greenwood County has experienced thirteen recorded incidences of tornado touchdowns since 1950. The most recent tornado occurred in April 2009 and no deaths or injuries were reported.

§ March 31, 1973: A category EF4 tornado crossed the County, and caused approximately \$2,500,000 in property damage in its path.

§ December 13, 1973: Two category EF3 and an EF4 tornado hit near Greenwood. Twenty-eight injuries were reported, two people were killed, and over \$2.5 million in property damage was recorded.

§ November 7, 1995: An uncategorized tornado hit the Troy. No one was injured. Nearly \$25,000 in property damage occurred as a result of this storm.

§ May 7, 1998: An EF1 tornado hit near Hodges causing \$75,000 in damage, but no injuries.

§ April 10, 2009: An EF1 tornado hit near the Harris Mill Village causing \$200,000 in damage, but no injuries. That same storm touched down near the Grendel Mill Village causing \$300,000 in damage there.

Manufactured housing is particularly vulnerable to high winds, whether from a tornado, thunderstorm, or tropical storm. There were 3,951 manufactured homes in Greenwood County in 2010. The City of Greenwood had 546, Ninety Six had 6 manufactured homes, and Ware Shoals had 60.

Structural Fires

Considering that each fire has the capacity to spread rapidly, and that the fire might encompass hazardous materials and highly flammable and explosive materials necessitating the evacuation of a large number of people, the fire rating is moderate.

Wildfire

Forest fires are a serious problem in Greenwood County. Records indicate that humans cause a majority of these fires. Approximately 22 fires occur each year, burning over 90 acres.

Other causes of fire include lightning, campfires, smoking, debris burning, incendiary equipment use, and railroads. In addition to the South Carolina Forestry Commission personnel, members of the Greenwood County rural fire departments assisted in extinguishing the fires which occurred.

Severe Thunderstorm

Greenwood County has numerous severe thunderstorms each year. These storms sometimes produce high winds, hail, lightning, and flash flooding. These factors can be made worse by the occasional tornado accompanying these events. The strongest recorded thunderstorm to strike Greenwood County occurred July 13, 1996 and produced wind to 86 mph with an estimated \$25,000 of damages. The most recently recorded severe thunderstorm events occurred in May 2014 with no damage or injury resulting. Impacts that can be expected or that have occurred in the past include downed trees, power outages, damage to homes and vehicles, and similar issues. A damage report is included in the addendum.

Drought

A severe drought has occurred in Greenwood County over the past several years. Other droughts happened during 1931-35, 1954-57, 1977-81, 1997-99, 2007-09, and 2011-12. Crop and Livestock Feed Assessment Reports confirm the droughts of the summer have devastated crops and pastures in the County. Soybeans and other crops have burned up due to extreme heat and below normal rainfall. Pastures and hay crops were extremely short with poor prospects for fall. There are few, if any, cases of livestock deaths due to loss of feed because most livestock would be sold at a loss before death. Many wells run dry and cause major inconveniences to people and some businesses. A chart is included in the addendum.

Earthquake

The only major recorded earthquake to be felt in Greenwood County was the Charleston Earthquake of 1886. Small quakes were also reported in 1924 and 1945. Tremors were felt in the Cokesbury community in September 1991 and in the southern part of the County on January 2, 1992. The second tremor was measured at 3.7 on the Richter scale and caused damage to one residence. A 4.1 magnitude quake based in neighboring Edgefield County shook the area but no damage was reported. Greenwood County is in the medium risk earthquake zone, meaning that it is an area where moderate damage may be expected. A sample map is included in the addendum.

Hail

Hail can occur across the region at various times of the year. Property damage can happen, as well as damage to crops. Since 2010, there have been 12 hail events in Greenwood

County. Hail sizes ranged from .75 inches to one report of 1.25 inches in May 2014. The most recent to cause damage was on March 15, 2008 in the Bradley community. These damages totaled \$2.8 million.

Windstorm

Windstorms not associated with hurricanes or thunderstorms are rare, but they have the potential to impact the region. There have been 16 high wind events in Greenwood County since 2010 causing \$50,000 in damage. The highest wind recently was 69 mph recorded on February 28, 2011 in Hodges.

Tropical system

Storms of this nature have impacted the county with mainly flooding. There is the potential for these storms to cause tornadoes as well as high wind gusts. Most of the storms of this type that have passed over Greenwood County have first struck the Gulf Coast and then proceeded north and east. Between 1850 and 2014, five tropical depressions, three tropical storms, and one uncategorized storm have passed over Greenwood County. Historically, systems outside of 25 miles from the center of Greenwood County, have not impacted the county. The entire county is equally susceptible to a tropical system.

A tropical depression has sustained wind speeds of less than 38 mph, a tropical storm has sustained winds between 39 and 73 mph, and a hurricane has sustained winds of 74 mph or greater.

Tropical Depression Arlene, 6/2/1959, Wind 20-30 mph, no flooding or damage reported

Tropical Depression Cleo, 8/30/1964, Wind 25-35 mph, no flooding or damage reported.

Tropical Depression Abby, 6/1/1968, Wind 25-35 mph, no flooding or damage reported.

Tropical Depression Danny, 7/24/1997, Wind 20-30 mph. no flooding or damage reported.

Tropical Depression Jeanne, 9/28/2004, Wind 20-30 mph, Severe urban flooding developed in the city of Greenwood, as the bypass at Burton Plaza was covered with water, and a small stream flooded a portion of Laurel St. Several other roads were closed around the city, including Scotts and Airport Roads

Technological Hazards

Technological and man-made threats represent a category of events that has expanded dramatically throughout the past decades with advancements in modern technology. Like natural threats, they can affect localized or widespread areas, are frequently unpredictable, can cause substantial loss of life and damage to property, and can pose a significant threat to the infrastructure of a given area. Technological and man-made threats include hazardous materials incidents at fixed facilities or in transit accidents, power failures, radiological incidents at fixed facilities or in transit accidents, other types of transit accidents, and structural fires.

The biggest threat to Greenwood County comes in the form of a potential transit accident. The position of the County between major urban areas and the number of major highways puts the County at high risk.

2. Priority Hazards

The historical hazard information provided insight into some of the high priority hazards that should be included in the plan; however, it did not capture all of the possible hazard risks in the county and municipalities. An additional review of possible hazard risks was conducted using the resources provided in “Understanding Your Risks – Identifying Hazards and Estimating Losses” (FEMA 386-2). The rationale for selecting these hazards is described in greater detail below.

Additional hazards were also identified and prioritized through an exercise that was conducted with the Core Planning Team. The participants were asked to identify natural and man-made hazards that occur in Greenwood County and rank the selected hazards from highest to lowest priority. The results of those exercises are included in this document. The text below provides a summary of how the priority hazards were determined using a combination of historical occurrences, public perception of hazard risk, and the probability of future occurrence based on other technical resources.

Prioritization of Hazards for Greenwood County

Based on these findings and the results of technical research the following hazards were selected as priority hazards for Greenwood County: Severe Winter Storms; Drought; Severe Thunderstorms/ Lightning; Tornadoes; Wildfires; Earthquakes; Hail or Wind storms; Hazmat Incident/Transportation; Structure Fires; Hurricane/Tropical Storm; Flooding and Terrorism.

To assess and evaluate hazards, four criteria have been established by the planning committee and each has been given a rating of low, moderate, or high risk.

Hazard Mitigation Plan

Greenwood County, SC

1. History – A record of occurrences
2. Vulnerability – The number of people and the value of property that could be affected
3. Maximum Threat – Assuming the greatest event possible and the worst case scenario impact
4. Probability – The likelihood an event will occur (chances per year)

In the scoring system, each of the four criteria identified for describing and analyzing potential hazards is assigned a rating and their respective number.

Low	1 point
Moderate	5 points
High	10 points

Since some criteria are judged to be more important than others, a weighting factor was established to balance out the total scoring. The following weights are used:

History	2
Vulnerability	5
Maximum Threat	10
Probability	7

A composite score for each hazard is arrived at by multiplying the score value assigned to each criterion by its weight and then summing the four totals. For example:

Hazard: Flood

History	High	$10 \text{ pts} \times 2 \text{ weighting factor} = 20 \text{ pts}$
Vulnerability	Moderate	$5 \text{ pts} \times 5 \text{ weighting factor} = 25 \text{ pts}$
Maximum Threat	High	$10 \text{ pts} \times 10 \text{ weighting factor} = 100 \text{ pts}$
Probability	Moderate	$5 \text{ pts} \times 7 \text{ weighting factor} = 35 \text{ pts}$
Total		$= 180 \text{ pts}$

All information has been compiled and created as to the various hazards in the County. Those hazards with the highest numerical scores will receive priority attention for planning and mitigation purposes.

B. Profile of Hazard Events

The second step in the risk assessment process was to create a profile of each of the priority hazards in Greenwood County. This analysis assisted in determining the potential damages in the county from natural and man-made hazards. This portion of the risk assessment was done through the use of Geographic Information Systems (GIS) software to develop maps

that show the geographic locations for some of the priority hazards. Maps were developed for specific hazards using existing data and then created by the Greenwood County Hazard Mitigation Plan coordinator. The remaining priority hazards are described in narrative form due to data limitations or an inability to map the geographic extent of the hazards.

1. Documented Hazards

Floods

Threat level: Moderate

Flooding is defined as a general and temporary condition of partial or complete inundation of normally dry land areas from: the overflow of inland or tidal waters; the unusual and rapid accumulation or runoff of surface waters from any source; or mudflows or the sudden collapse of shoreline land. Flooding is one of the high priority natural hazards in Greenwood County. This is largely due to the physical geography of the county, which includes several rivers and creeks as well as a varied topography.

Identification of floodplain areas within the county and the incorporated municipalities was based on the most recent Flood Insurance Rate Maps (FIRM) produced by FEMA. These maps display the locations of all of the major water bodies in the county and delineate the 100-year floodplain boundaries (Zone A). These are areas that have a one percent chance of equaling or exceeding the recorded base flood elevation during any year. Based on these maps the unincorporated areas of the county and each of the three incorporated municipalities have 100-year floodplains within their jurisdictions. Though not completely indicated on the FEMA FIRM, according to the Greenwood County Comprehensive Plan, nuisance flooding impacts many roads in Ninety Six due to poorly designed and maintained drainage systems. Two particular areas of concern are at the Highway 25 Bypass under the railroad bridge and Sample Road. There are no repetitive loss structures in Greenwood County.

Rivers and creeks designated as flood prone areas include but are not limited to the following: Saluda River, Turkey Creek, Mulberry Creek, Coronaca Creek, Rocky Creek, Wilson Creek, Brightman Creek, Henleys Creek, Ninety Six Creek, Hard Labor Creek, Reedy Branch, Cuffeytown Creek, Horsepen Creek, and Beaverdam Creek. Potential flooding impact in or near the City of Greenwood is from Sample Branch, Rocky Creek, Wilson Creek, Stockman Branch, and Hard Labor Creek. Potential flooding impact in the Town of Ware Shoals occurs near Turkey Creek and Saluda River. Potential flooding impact near the Town of Ninety Six occurs along Wilson Creek. Flood levels have reached 6 to 9 feet in several areas within the county.

Digital (Q3) FEMA flood hazard maps are not available for any of the jurisdictions. If they become available they will be incorporated into future plan updates. In the absence of

Hazard Mitigation Plan

Greenwood County, SC

FEMA Q3 flood hazard maps, plan developers marked area maps to further indicate the location of the flood hazard areas, as defined in the paper FEMA FIRMs, for Greenwood County (unincorporated areas only) and Greenwood. FIRMettes created from the FEMA Flood Map store on the FEMA Website are provided for Ware Shoals and Ninety Six. These maps are numbered beginning 45047C0075D through 45047C0350D. In addition, FEMA Flood Insurance Rate Maps for each jurisdiction are available online.

Greenwood County Flood Hazard Areas

Jurisdiction	FEMA Mapped Special Flood Hazard Area	NFIP Participant	Flood Hazard Area Map Included in Plan
Greenwood County (unincorporated areas only)	Yes	Yes	Yes
Greenwood	Yes	Yes	Yes
Ninety Six	Yes	Yes	Yes
Ware Shoals	Yes	Yes	Yes

Based on continuing and on-going participation in the National Flood Insurance Program, all future development will conform to NFIP standards. These standards are also used to prioritize action steps of this plan. There have been no changes since the original hazard mitigation plan was completed.

Greenwood County: Multi-jurisdiction Flood Hazard Ratings

Jurisdictions	History	Vulnerability	Threat	Probability	Total Score
Greenwood County (unincorporated areas only)	20	25	50	35	130
Greenwood	20	25	50	35	130
Ninety Six	20	25	50	35	130
Ware Shoals	20	35	50	45	150

Earthquake

Threat level: Moderate

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulation within or along the edge of Earth's tectonic plates. The severity of these effects is dependent on the amount of energy released from the fault or epicenter. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and after just a few seconds can cause massive damage and extensive casualties. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure.

Peak ground acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity. Based on the national map provided by the USGS shows the PGA values for areas with a 10% chance of being exceeded over 50 years the entire state of South Carolina has an earthquake

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risk as it is located in the .10 – .15% g area. According to FEMA, areas with a .3%g PGA or more are considered to have a moderate to high earthquake hazard risk and should consider earthquake hazards when developing hazard mitigation plans. In Greenwood County, the earthquake risk is relatively low compared to other portions of the state or even the country. However, if there was even a moderate earthquake in the area, damage could be very high.

Proximity to faults, along with soil and subsurface characteristics, can all affect the level of earthquake hazard. A sample map is included in the addendum. It is important to note however the proximity of Greenwood County to other areas of earthquake activity. The Central and Southeast U.S. region covers a large area of relatively diffuse, low rate seismicity. Principal areas of activity include the New Madrid Seismic Zone, East Tennessee, and Southern Appalachian Seismic Zones. These factors increase the likelihood of Greenwood County experiencing or being affected by an earthquake at some point in time. Tremors shook the area in 1924 and 1945. A 3.0 was felt in the Cokesbury community in September 1991, and a 3.7 tremor occurred in the County on January 2, 1992. A 4.1 magnitude quake was centered in neighboring Edgefield County on February 15, 2014.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
10	25	50	35	120

Hazardous Materials Incident

Threat level: Moderate

The term technological hazard refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. For the purposes of this risk assessment it is assumed that technological emergencies are accidental and that their consequences are unintended.

Hazardous materials incidents typically take two forms, fixed facility incidents and transportation incidents. The major difference between the two is that it is reasonably possible to identify and prepare for a fixed site incident, because laws require those facilities to notify state and local authorities about what is being used or produced there. Transportation incidents are substantially harder to prepare for, however, because it is difficult to determine what material(s) could be involved until the accident actually happens.

In order to profile the technological hazards in Greenwood County information was compiled on the locations of facilities that store hazardous materials. Based on records provided by the Greenwood County Office of Emergency Management there are facilities in the county

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that store hazardous materials, some of which are facilities that store extremely hazardous substances (EHS). An attached map shows the locations of these facilities across the county.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	25	100	35	180

Terrorism

Threat level: Moderate

The term terrorism refers to intentional criminal and malicious acts. For the purposes of this risk assessment terrorism refers to the use of Weapons of Mass Destruction (WMD), including, biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and cyber terrorism.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
2	15	50	35	102

Severe Winter Storm

Threat level: High

Winter storms vary in size and strength and can be accompanied by strong winds that create blizzard conditions and dangerous wind chill. There are three categories of winter storms. A blizzard is the most dangerous of all winter storms. It combines low temperatures, heavy snowfall, and winds of at least 35 miles per hour (mph), reducing visibility to only a few yards. A heavy snowstorm is one that drops 4 or more inches of snow in a 12-hour period. An ice storm occurs when moisture falls and freezes immediately upon impact. For the purposes of this risk assessment, it is assumed that all of Greenwood County is equally at risk from severe winter storm events, but is at most risk of an ice storm.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	50	100	70	240

*Severe Thunderstorms/Lightning**Threat level: Low*

A severe thunderstorm as defined by the National Weather Service is a storm with hail equal to or greater than 3/4" in diameter or convective wind gusts equal to or greater than 58 mph. Lightning and general thunderstorm wind gusts pose a threat to life and/or property. Severe thunderstorms also have the potential of producing a tornado with little or no advanced tornado warning. Based on historical evidence it is assumed that all of Greenwood County is equally at risk from severe thunderstorm events.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	15	10	35	80

*Windstorms**Threat level: Low*

For the purposes of this risk assessment windstorms are destructive wind events that occur with or without the presence of other storm events, such as tornados or severe thunderstorms. Localized geographic conditions can exacerbate the damages from high winds and cause increases in wind intensity. Greenwood County has experienced high wind damages in the past and can expect wind-related problems in the future. This assessment assumes that the risks from high wind events are equally distributed throughout the county.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	15	10	35	80

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of 1 mile wide and 50 miles long. Tornadoes are among the most unpredictable of weather phenomena. Tornadoes can occur in any state in the U.S. but are more frequent in the Midwest, Southeast, and Southwest.

Tornadoes, by nature, strike at random. While it is known that some areas of the country experience tornadoes more than others, predicting exactly what parts of Greenwood County have a greater chance of being struck by a tornado is difficult. The best predictor of future tornadoes is the occurrence of previous tornadoes. According to county records there have been at least eleven recorded tornado events in Greenwood County since 1950. These tornadoes ranged EF0 to EF4 on the Fujita Tornado Measurement Scale, which categorizes tornadoes based on wind speed and expected damages. An EF1 tornado is considered a moderate tornado with wind speeds ranging from 73 to 112 mph and can cause damages such as moving cars off roads and mobile homes off of foundations. An EF2 tornado is a significant tornado with wind speeds from 113 to 157 mph can cause considerable damages such as torn off roofs and uprooted trees. An EF3 tornado would have wind speeds in excess of 158 mph and would cause significant damage, and an EF4 would have even higher wind speeds and do more damage.

For planning purposes it is less important to map the tornado risk than it is to identify it. This is because it is so difficult to predict the path of future tornadoes. The Fujita scale provides us with an idea of the strength and extent of damages of tornadoes that can occur in Greenwood County. An additional resource to help understand the extent of tornado risks is the “Design Wind Speed Map” developed by the American Society of Civil Engineers (ASCE). According to this map the entire state of South Carolina is located in Zone III, which is an area associated with up to 200-mph wind speeds.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	25	50	70	165

*Drought**Threat level: Moderate*

Drought refers to an extended period of deficient rainfall relative to the statistical mean for a region. Drought can be defined according to meteorological, hydrological, and agricultural criteria. Meteorological drought is qualified by any significant deficit of precipitation. Hydrological drought is manifest in noticeably reduced river and stream flow and critically low groundwater tables. The term agricultural drought indicates an extended dry period that results in crop stress and harvest reduction.

The Palmer Drought Severity Index (PDSI) is a widely used measure of drought in the United States to track moisture conditions. The PDSI is defined as “an interval of time, generally in months or years in duration, during which the actual moisture supply at a given place rather consistently falls short of the climatically expected or climatically appropriate moisture supply”. The range of PDSI is from -4.0 (extremely dry) to +4.0 (excessively wet), with the central half (-2.0 to +2.0) representing the normal or near normal conditions.

In 2011, Greenwood County experienced extreme drought (-4.0 and below on the Palmer Drought Severity Index) in the months of January, February, August, September, October, and December. There were also periods of extreme drought during 2012 in the months of January, February, March, April May, and June. (Source: South Carolina State Climatology Office)

For the purposes of this risk assessment it is assumed that Greenwood County has a high drought risk. The risk of drought is not targeted to any particular areas within the county.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	25	50	35	130

*Hailstorms**Threat level: Low*

Hailstorms occur when freezing water in thunderstorm type clouds accumulates in layers around an icy core. Hail causes damage by battering crops, structures, automobiles, and transportation systems. When hailstorms are large (especially when combined with high winds), damage can be extensive. Based on available data at the state level it is assumed that the entire county is at moderate risk from hailstorms.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
10	5	10	7	32

*Wildfires**Threat level: Moderate*

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the area for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires.

Wildfire maps do not show the extent or range of where a wildfire will occur because they are dependent on the amount of fuel available, weather conditions, and wind speed and direction. As there is no historical record of wildfires in Greenwood County this assessment does not map previous locations of wildfires as a determinant for future wildfire events. Based on available data at the state level it is assumed that the entire county is at moderate risk from wildfires.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	25	100	35	180

*Structure Fires**Threat level: High*

A structure fire is any instance of uncontrolled burning which results in major structural damage to residential, commercial, industrial, institutional, or other properties in developed areas. Municipalities with significant development in either a downtown area or an industrial park are prime targets for this type of occurrence. For the purposes of this risk assessment urban fire hazards will be considered moderate for the incorporated municipalities of the county.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	50	100	70	240

*Tropical Systems**Threat level: Moderate*

The probability of a hurricane striking South Carolina is less than eight percent in any given year. Any or all counties could be affected with varying degrees of damage. The worst case scenario for Greenwood County would be for a strong hurricane to strike the Beaufort/Savannah area and maintain strength as it moves inland quickly. Most of the storms that pass directly over the County approach from the southeast and have weakened considerably over time and the land mass.

Hazard Rating

<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
20	25	50	35	130

VI. Hazard Analysis Table

<u>Threat</u>	<u>History</u>	<u>Vulnerability</u>	<u>Threat</u>	<u>Probability</u>	<u>Total</u>
Winter Storm	20	50	100	70	240
Structure Fire	20	50	100	70	240
Wildfire	20	25	100	35	180
Haz Mat	20	25	100	35	180
Tornado	20	25	50	70	165
Drought	20	25	50	35	130
Trop System	20	25	50	35	130
Earthquake	10	25	50	35	120
Dam Failure	2	15	50	35	102
Terrorism	2	15	50	35	102
Thunderstorm	20	15	10	35	80
Windstorm	20	15	10	35	80
Hailstorm	10	5	10	7	32

Greenwood County: Multi-jurisdiction Flood Hazard Numerical Analysis

Jurisdictions	History	Vulnerability	Threat	Probability	Total Score
Greenwood County (unincorporated areas only)	20	25	50	35	130
Greenwood	20	25	50	35	130
Ninety Six	20	25	50	35	130
Ware Shoals	20	35	50	45	150

Threat Level Rankings

<u>Total Score</u>	<u>Threat Level</u>
0 – 99	Low
100 –199	Moderate
200	High

VII. Vulnerability Assessment

The vulnerability assessment uses the hazard profile information and combines it with community asset information to analyze and quantify potential damages from future hazard events. This process combines the final two steps of the risk assessment: the inventory of assets and the estimation of losses.

The vulnerability assessment evaluates each type of hazard based upon its frequency and severity to determine which hazards represent the greatest potential risk. The state EMD and the University of South Carolina Hazards Lab developed a format for each County to use to determine their most vulnerable areas. This process helped evaluate the hazard vulnerability of each county utilizing an index calculated from hazard event frequency and a social vulnerability score. This social vulnerability score utilizes data from the US Bureau of the Census (age, income, etc) to determine the social vulnerability. The most vulnerable area in the County is north of the City of Greenwood between Hodges and Lake Greenwood, west of Ninety Six, and the southern third of the County from Kirksey to Troy.

The overall determination from the risk assessment methodology utilized in this plan is that Greenwood County is vulnerable to many types of hazards. Slight variations in terms of which hazards may pose the greatest risk exist depending on the analysis method utilized to assess the risk. The methodology suggests that potential vulnerability to multiple types of hazards exists, including winter storms, tornadoes, flooding, wildfire, hazardous materials, drought, and other forms of severe weather.

Included in the Appendix to this plan are maps showing county location, hazardous material sites, potential accident zones for fixed chemical facilities, composite social vulnerability, overall place vulnerability, and composite hazard zones. The chemical facilities map overlays major highways and railroads with the evacuation areas from chemical facilities. The composite social vulnerability map shows how certain Census criteria (age, income, etc.) determine geographic concentrations of people who have the highest potential for negative impact of natural hazards. The place vulnerability shows areas where there is high possibility for

natural hazards. The most vulnerable places are around the municipalities of Greenwood and Ninety Six. The mapped composite map combines the previous two maps to show the most vulnerable parts of the county. In the case of Greenwood County, the most vulnerable areas overall are around the City of Greenwood, and north and east towards Lake Greenwood.

Asset Inventory

The asset inventory identifies buildings, roads, and other facilities that can be damaged or affected by hazard events. In order to assess where and to what extent the identified hazards will affect the assets of Greenwood County the locations of assets were identified and intersected with the mapped hazards in GIS.

The information source used to compile the asset inventory was the E-911 database and maps created by MSAG as part of the Greenwood County E-911 addressing project. This project assigned street addresses to all structures and located them on maps in relation to identified roadways in the county.

According to the E-911 database and Census figures, there are approximately 12,000 structures throughout the county. Also taken from the E-911 database was the location of infrastructure including roadways, railroads, and utilities, which were also intersected with hazard data in GIS to determine vulnerability. Using the data supplied by the Greenwood County Office of Emergency Preparedness and local law enforcement maps were developed to show the locations of critical facilities. Critical facilities are defined as facilities that are critical to the health and welfare of the county and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and schools. According to this data there are over 30 critical facilities in Greenwood County.

Flood

According to the South Carolina Department of Natural Resources, there are no repetitive loss structures due to flooding in Greenwood County. Riverine flooding is rare and occurs in areas with no structures or regular habitation. Urban storm water flooding is sporadic and affects areas such as the Highway 221 Bypass under the railroad trestle.

Infrastructure layers were also intersected with floodplain data across the county to determine the location and amounts of vulnerable roadways, railroads, and utilities. These mapped areas are shown on the Overall Place Vulnerability maps in the appendix to this document.

Technological Hazards

The Hazardous Material Sites map shows the locations of facilities that store hazardous materials or extremely hazardous materials and their locations throughout the county. Hazardous materials are any substance or material that when involved in an accident and released in sufficient quantities, poses a risk to public health, safety, or property. Sites included in this map are based on data that was made available by the Greenwood County Office of Emergency Preparedness. There are over 50 sites located in the county that store hazardous materials.

Non-Mapped Hazards

The remaining natural hazards (earthquake, winter storm, hailstorm, thunderstorm, windstorm, drought, wildfire, hurricane/tropical storm etc.) can be considered to have equal risk and impact throughout the county, therefore, an asset inventory was not conducted as all assets within the county would be considered at risk.

VIII. Loss Estimation

The final step in the risk assessment process is the loss estimation. This step helps to estimate the potential losses for any hazard event. Because the most likely hazards could occur at virtually any location in Greenwood County, the loss estimations are generalized and cover the total impact a disaster may have on the population as a whole.

Greenwood County Loss Estimation Tables

<u>Facility</u>	<u>Population</u>	<u>Number of Buildings</u>	<u>Approximate Value*</u>
Residential	69,661	30,951	\$3,252,950,000
Commercial		8,700	\$1,305,000,000
Public Buildings/Critical Facilities		20	\$ 35,000,000
Waste Treatment		Lines, plants, and Pump stations	NA
Schools		24	NA
Police		4	NA

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Fire		13	NA
Hospital		1	NA
Hazardous Facilities		<u>50</u>	<u>NA</u>
Totals	69,723	40,000	\$4,357,950,000

*Estimates provided by research with tax assessor and personal knowledge. Average home value is \$105,100. Average business value estimated at \$150,000.

Future building locations are governed by zoning regulations in Greenwood County, the City of Greenwood and the Towns of Ninety Six and Ware Shoals. These regulations identify the types of uses in general areas. These communities also enforce flood ordinances and building codes that outline construction standards which minimize flood risk. However, structures are not allowed for construction within the floodway. Therefore, the only major losses to future buildings should be in cases where random natural events like tornadoes or fires occur. Since these events are random, Greenwood County and the municipal governments strive to place and secure future buildings in locations that offer them the best protection possible from natural hazards.

City of Greenwood Loss Estimation Tables

<u>Facility</u>	<u>Population</u>	<u>Number of Buildings</u>	<u>Approximate Value*</u>
Residential	23,379	10,230	\$ 914,562,000
Commercial		3,300	\$ 330,000,000
Public Buildings/Critical Facilities		4	\$ 7,000,000
Totals	23,379	13,534	\$1,251,562,000

*Estimates provided by research with tax assessor and personal knowledge. Average home value is \$89,400. Average business value estimated at \$100,000.

Town of Ninety Six Loss Estimation Tables

<u>Facility</u>	<u>Population</u>	<u>Number of Buildings</u>	<u>Approximate Value*</u>
Residential	1,936	941	\$ 56,177,700
Commercial		125	\$ 11,250,000
Public Buildings/Critical Facilities		2	\$ 3,500,000
Totals	1,936	1,068	\$ 70,927,700

*Estimates provided by research with tax assessor and personal knowledge. Average home value is \$59,700. Average business value estimated at \$90,000.

Town of Ware Shoals Loss Estimation Tables

<u>Facility</u>	<u>Population</u>	<u>Number of Buildings</u>	<u>Approximate Value*</u>
Residential	2,363	1,100	\$ 58,520,000
Commercial		150	\$ 13,500,000
Public Buildings/Critical Facilities		3	\$ 3,000,000
Totals	2,363	1,253	\$ 75,020,000

*Estimates provided by research with tax assessor and personal knowledge. Average home value is \$53,200. Average business value estimated at \$90,000.

IX. Analysis of Development Trends

Within the last calendar year, development has started to slowly pickup from the lows of the national recession in previous years. New residential development is taking place adjacent to or within areas that were previously developed. Commercial development is beginning to slowly happen around the Highway 72 Bypass area. The only industrial development is happening on Highway 246 near existing industries. The new growth in the past five years has not put a strain

on existing capacities and has not been located in areas that are more prone to natural hazards. It is expected that this type of growth will continue in the future.

The county and municipalities in Greenwood County participate in a joint planning commission. A comprehensive plan was updated for jurisdictions and adopted by all the jurisdictions except for Hodges in 2011. The comprehensive plan was used as a reference in updating this plan.

V. Capabilities Assessment

The capability assessment describes the legal authority vested in local governments to pursue measures to mitigate the impacts of natural hazards. This capability assessment focused on the evaluation of Greenwood County's existing programs and policies to determine what vehicles are already in place to support mitigation activities. These policies and programs were identified based on a review of existing plans and ordinances for the county and each of the municipalities. Programs or regulations that related to mitigation or supported mitigation activities were selected. The following list the identified programs.

A. Greenwood County	Emergency Preparedness Office Sheriff's Office County Government	Contact: George McKinney Tony Davis Toby Chappell
B. City of Greenwood	Police Fire Town Government	Charlie Barrineau
C. Ninety Six	Police Fire Town Government	Arvest Turner
C. Ware Shoals	Police Fire Town Government	John Hansen

Comprehensive Plans and zoning ordinances exist in each of the municipalities. Integrating mitigation concepts and policies with existing comprehensive plans provides and expanded means for implementing initiatives through established, legal frameworks. The foundation of these plans lies in the promotion of health, safety, efficiency, and well being for all segments of the population. Some of the primary plan objectives include preservation of the

County's unique natural environment and historic heritage, creation of a stable and diverse economy, and promoting sustainable developments. A local hazard mitigation initiative can be strengthened by finding opportunities where the implementation of other County goals and policies also supports the mitigation recommendations presented in this plan.

Zoning is countywide and in the municipalities. Zoning can be used to restrict growth in high-risk areas, allow low-density development or designate only certain uses in hazard prone areas. All the zoning ordinances require erosion control practices for ground disturbing activities, protection of existing waterways, and re-vegetation. These practices and others promote best management practices and reduce the risk of flooding hazard in particular.

The County does have a land development ordinance. This document supports hazard planning by regulating building construction in flood plains.

Building codes are important in mitigation because codes are developed for areas of the state in consideration of types, frequency and intensity of hazards present in that geographic region. Consequently, structures that are built to applicable codes are inherently resistant to many hazards like strong wind, floods, and earthquakes.

Intergovernmental cooperation is a great asset to the implementation of hazard mitigation actions. This way local and State agencies can act as resources for each other. Interaction between the County, towns, and regional planning organizations occurs in areas such as plan development and grant writing.

The major conclusion reached after conducting the capability assessment is that Greenwood County will need to rely on technical and financial assistance from various resources to effectively implement hazard mitigation actions over the next five years. The constraints facing the County and especially the municipalities include both limited staff resources and extremely limited funding.

During this planning process, it is apparent that the County has a strong capability to bring together various groups to work together in crafting better communities of the future. The same cooperative effort, if joined with the appropriate technical and financial assistance from regional, state, and federal resources, can be harnessed to implement the priority hazard mitigation actions. A sustained effort by citizens, staff, and local officials can create a more sustainable and disaster resistant future.

Each of the local governments has the capacity to handle mitigation issues, but are limited due to funding and limited staff. The results of the capability assessment help to provide the framework for developing recommendation for specific mitigation actions. It also helps to identify shortfalls in the local government capabilities as well as draw attention to existing

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successes. The capability assessment was analyzed then used to rank the mitigation strategies according to the capability of the county or the municipalities to implement the actions.

Incorporation of the requirements of the mitigation plan into existing planning mechanisms

Existing Planning Mechanisms

Jurisdiction	Comprehensive Plan	Capital Improvement Plan	Building Code	Flood Hazard Ordinance	Zoning Ordinance	Emergency Operations Plan
Greenwood County	Yes	No	Yes	Yes	Yes	Yes
Greenwood	Yes	No	Yes*	Yes	Yes	No
Ninety Six	Yes	No	Yes*	Yes	Yes	No
Ware Shoals	No	No	Yes*	Yes	Yes	No

*The Greenwood County Building Code applies to these jurisdictions. Each jurisdiction contracts with Greenwood County for code enforcement.

There are several ways to incorporate the hazard mitigation plan requirements into the existing planning processes. First, the comprehensive plans are updated every five years and cover features of the jurisdictions such as natural resources and community facilities. Planning commissions within each jurisdiction revise the plans then recommend the revised plan to the local governing bodies for approval. Using this process, hazard mitigation elements can be included in plan updates.

None of the jurisdictions have capital improvement plans, however, capital improvement activities are usually included as part of the comprehensive plans. The zoning ordinances are built from the findings of the comprehensive plan, so changes to the zoning ordinances can be made after the comprehensive plan is updated.

Updating the comprehensive plan would cover areas such as economic development, land use, natural resources, road construction and community facilities. From that, then the zoning ordinance could reflect needed changes for issues such as development, land uses, storm water retention or road grading activities.

The emergency operations plans are maintained by the county emergency operations office. These plans can be updated and include hazard mitigation findings as they are updated by the county emergency preparedness directors.

Building codes are standard across the county and can be updated with hazard mitigation findings by the governing body of each local government. In addition, the state has adopted the Southern Building Code. As changes are made to the state building code by the state legislature local jurisdictions may adopt those changes and incorporate them into local building codes.

Each municipality has a floodplain ordinance. Revisions, which might include adoption of more stringent floodplain regulations, are accomplished through review and adoption by the governing council. Based on continuing and on-going participation in the National Flood Insurance Program, all future development will conform to NFIP standards. No building is allowed within identified flood plains. The county planning office and county engineer are responsible for reviewing development information to determine flood plain applicability using local map sources and FEMA map sources. This process is continuous and on-going and a requirement of NFIP participation. These standards are also used to prioritize action steps of this plan.

Public hearings, which provide an opportunity for public comment, are required prior to adoption of any of the above planning mechanisms.

X. Mitigation Goals, Objectives, Strategies and Projects

Using the findings from the risk assessment and the capabilities assessment as a guide the planning committee developed the following mitigation goals, objectives, and strategies for implementation. Goals and objectives were developed in a working session with the planning committee with a period provided for comment and revision. Once the final goals and objectives were determined the planning committee developed the mitigation strategies that would aid the county in meeting the goals and objectives identified in the plan. Strategies were selected using the information obtained from the capabilities assessment, which identified existing programs and shortfalls related to mitigation activities.

The Hazard Mitigation Planning committee reviewed the following existing plans and technical information before and during the update process of the mitigation strategies: Greenwood County Hazard Mitigation Plan, Greenwood City/County Comprehensive Plan, City/County Zoning Ordinance, City/County Flood Plain Ordinance, weather reports from the National Oceanographic and Atmospheric Administration and various instructional materials from the Federal Emergency Management Agency. Relevant information from these documents was placed at the pertinent location in this updated plan.

The committee decided that they would take the entire existing plan and review it to start the update process. Members marked up the plan and brought, mailed, emailed, or discussed those proposed changes with the plan coordinator. The goal section was reviewed to determine which goals had been accomplished, which goals still needed to be accomplished, and which goals were no longer relevant. Updated Census information was used where available and

appropriate to make the plan as relevant as possible. Storm and weather events since the last update were also included to determine if there are patterns that are affecting particular areas or populations. All this information was deemed important to having the most complete plan possible for the county.

The goals for this plan are consistent with the hazard vulnerabilities as determined through the process laid out by SC EMD and the University of South Carolina. Sample goals were drawn from analysis of Mitigation 20/20 software provided by SC EMD. Working towards achieving all of these goals is expected to minimize hazard-related losses associated with any of the hazards for which Greenwood County is potentially at risk. Projects will be assigned a priority and feasibility rank, in addition to having a listing of implementing agencies and a general timeframe for implementation.

Funding for these goals will be achieved by local general funds, grant funds, in-kind assistance or some combination of the above. Funding is always a struggle and will continue to be one in the future. Whatever funding resource that best serves the goal will be used and the county staff is expert in utilizing all available resources for funding.

Based on the recommendations of the planning committee the following implementation schedule has been developed. Projects have been listed by priority according to the ranking assigned by the planning committee (H=High, M=Medium, L=Low). Feasibility to implement the projects is based on the results of the capability assessment.

- High Priority Projects with High Feasibility.
- High Priority Projects with Medium Feasibility.
- Medium Priority Projects with High Feasibility.
- Medium Priority Projects with Medium Feasibility.
- Medium Priority Projects with Low Feasibility.
- Low Priority Projects.

The Core Planning Team ranked projects based on a cost-benefit review that showed which projects were most needed, which of these projects was the most likely to be accomplished, and which would most effectively address mitigation needs. In addition to reviewing potential monetary costs, the team considered the social impact of each potential project, the technical capabilities of the local government to carry through the project, impact on the environment, ability of the local government to maintain the project, and any political or legal effects of the decision. This cost-benefit review was the basis for each of the project feasibility rankings.

Greenwood Countywide Goals

Goal 1: Reduce impact of hazards on the citizens, private businesses, non-government organizations and government organizations county-wide.

Strategies

- A. Develop a comprehensive hazard analysis for county-wide use in planning and operations.
- B. Develop and provide education to the population.
- C. Identify vulnerable populations based on factors such as age, income level, race, ethnicity or disability.
- D. Perform preventive actions which reduce impacts.

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Greenwood County, SC

Action	Jurisdiction	Responsible Party	Time Frame	Priority	Feasibility	Hazards Addressed	Funding
Develop and maintain a building inventory that contains information regarding location, type of structure, construction material, date of construction and modification, whether the building is consistent with current building codes, and other pertinent information.	Greenwood County and City of Greenwood	Greenwood County/City GIS and Assessor Department	Ongoing	Moderate	Moderate	Dam failures, earthquakes, floods, tropical storms, severe storms, tornadoes, windstorms, structure fires, wildfires, winter/ice storms	General Funds
Establish specific mitigation strategies for extremely vulnerable structures identified during the development of the building inventory.	Greenwood County and City of Greenwood	Greenwood County/City Emergency Management and City Building Department	Ongoing	Moderate	High	Dam failures, earthquakes, floods, tropical storms, severe storms, tornadoes, windstorms, structure fires, wildfires, winter/ice storms	General Funds and Government Grants
Develop a standardized, integrated database of utility distribution systems, utility facilities, critical facilities, county facilities, roads, streams/rivers, and other data deemed necessary.	All Jurisdictions	Greenwood County GIS and City and County Public Works	Ongoing	High	High	All hazards	General Funds and Government Grants
Develop and maintain a database of natural hazardous events which occur within the jurisdictions. Data collected will include type, location and extent.	All Jurisdictions	Greenwood County Emergency Management	Ongoing	High	High	All hazards	General Funds and Government Grants
Conduct a feasibility study to determine if a zoning ordinance would promote community safety and hazard mitigation with regards to new development.	Greenwood County	Greenwood County Emergency Management	Ongoing	High	High	Crimes, civil disturbances, dam failures, earthquakes, floods, structure fires, wild fires	General Funds

Hazard Mitigation Plan

Greenwood County, SC

Action	Jurisdiction	Responsible Party	Time Frame	Priority	Feasibility	Hazards Addressed	Funding
Educate public about wildfire dangers, and open burning safety, cigarette litter, and campfire safety.	All Jurisdictions	All Fire Departments within Greenwood County & Municipalities	Ongoing	Moderate	High	Wildfire	General Funds and Government Grants
Create buffer zones around structures in wild land-urban interface areas.	Greenwood County and City of Greenwood	All Fire Departments within Greenwood County & Municipalities	Ongoing	Moderate	High	Wildfire	Private Funds
Develop a more effective fire condition notification system plan.	All Jurisdictions	Greenwood County Fire Coordinator	1-2 years	Moderate	High	Wildfire	General Funds
Identify safe storm shelters in communities and educate residents as to where to seek shelter.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	High	High	Tropical storms, severe storms, tornadoes, windstorms	General Funds
Educate public about the importance of weather radios and where to obtain them.	All Jurisdictions	Greenwood County Emergency Management	Ongoing	High	High	Floods, tropical storms, severe storms, temperature extremes, tornadoes, windstorms, winter/ice storms	General Funds
Remove dead trees or trim large branches located near structures.	All Jurisdictions	Greenwood County Fire Coordinator and Municipal Fire Chiefs	Ongoing	High	Moderate	Tropical storms, severe storms, tornadoes, windstorms, winter/ice storms	General Funds
Conduct a commodity flow study on major roadways in the county.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	1-2 years	Low	Moderate	Disruption of transportation, hazardous materials	Hazardous Materials Emergency Preparedness Grant
Identify vulnerable populations	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Immediate	High	High	All hazards	General Funds

Hazard Mitigation Plan

Greenwood County, SC

Action	Jurisdiction	Responsible Party	Time Frame	Priority	Feasibility	Hazards Addressed	Funding
Work through schools, volunteer groups, senior groups, or home health organizations to provide information to vulnerable populations regarding household and personal hazard preparedness.	All Jurisdictions	Greenwood County Emergency Management	Ongoing	High	High	All hazards	General Funds and Government Grants
Work through schools, volunteer groups, senior groups, or home health organizations to provide information to vulnerable populations regarding resources available during hazard events.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	High	High	All hazards	General Funds
Coordinate with schools, volunteer groups, senior groups, or home health organizations to provide first aid training to vulnerable populations.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	High	High	All hazards	General Funds, Red Cross First Aid Trainers
Expand established programs and organizations to provide weather radios to vulnerable households.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	Moderate	Moderate	Floods, tropical storms, severe storms, temperature extremes, tornadoes, windstorms, winter/ice storms	Donations and potential Grants (Private and Government)
Expand established programs and organizations to provide first aid kits to vulnerable households.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	Moderate	Moderate	All hazards	Donations and potential Grants (Private and Government)
Coordinate with established programs and organizations to provide smoke detectors to vulnerable households.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	Moderate	Moderate	Structure fire	Donations and potential Grants (Private and Government)
Work with home health and other private entities to educate special needs individuals regarding self-sustaining practices or whom to communicate with during emergencies.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	High	Moderate	All hazards	General Funds

Hazard Mitigation Plan

Greenwood County, SC

Action	Jurisdiction	Responsible Party	Time Frame	Priority	Feasibility	Hazards Addressed	Funding
Provide information to the public regarding procedures to follow in the event of a dam failure.	All Jurisdictions	Greenwood County Emergency Management	Ongoing	High	High	Dam failure	General Funds
Educate about and encourage participation in the National Flood Insurance Program.	All Jurisdictions	Greenwood County Building Codes	Ongoing	High	High	Floods	General Funds
Educate public about personal/household preparedness.	All Jurisdictions	Greenwood County Emergency Management	Ongoing	High	High	All hazards	General Funds
Educate property owners constructing new buildings or renovating old ones about storm proofing techniques.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	High	High	Tropical storms, severe storms, tornadoes, windstorms, winter/ice storms	General Funds
Institute a standard warning system for dam failure.	All Jurisdictions	Greenwood County Emergency Management	3-5 years	Moderate	Moderate	Dam failure	General Funds and Government Grants
Provide generators for general population shelters as well as critical infrastructure	All Jurisdictions	Greenwood County Emergency Management	3-5 years	High	Low	Tropical Storms, severe storms, tornadoes, wind storms, and ice storms.	General Funds
Assess schools for tornado safety and if needed construct safe rooms within the school	All Jurisdictions	Greenwood County School Districts 50, 51 and 52	Ongoing	Moderate	Low	Tornado and severe storms	General Funds
Develop data base identifying flooding locations along roads and bridges	Greenwood County and City of Greenwood	Greenwood County and City PW and SCDOT	Ongoing	High	High	Flooding	General Funds
Work with local governments to target storm water issues and develop plans to reduce impacts	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Ongoing	High	Moderate	Flooding	General Funds

Goal 2: The community will have the capability to initiate and sustain emergency response operations during and after an event.

Strategies

- A. Critical facilities will be functional during event
- B. Organizations county-wide will have the ability to respond effectively to and recover critical functions quickly after events.

Hazard Mitigation Plan

Greenwood County, SC

Action	Jurisdiction	Responsible Party	Time Frame	Priority	Feasibility	Hazards Addressed	Funding
Develop a specific definition of 'critical facilities'.	Greenwood County and City of Greenwood	Greenwood County Emergency Management	Immediate	High	High	All hazards	General Funds
Complete a hazard and vulnerability assessment and mitigation strategy for each critical facility.	All Jurisdictions	Greenwood County Emergency Management	1-2 years	High	High	All hazards	General Funds and Government Grants
Develop an inventory of response assets and capabilities.	All Jurisdictions	Greenwood County Emergency Management	Ongoing	High	Moderate	All hazards	General Funds
Increase training and capability of response teams as well as communication and integration with mutual aid assets.	City of Greenwood and Greenwood County	Greenwood County Emergency Management	Ongoing	High	High	All hazards	General Funds and Government Grants
Increase training and capabilities by organizing and running training exercises to cover a variety of hazards (dam failure, hazmat, hurricane, winter storm, etc.).	All Jurisdictions	Greenwood County Emergency Management	Ongoing	High	High	All hazards	General Funds and Government Grants
Create positions within the Greenwood County Emergency Services Department to improve fire response times, preplanning capabilities and equipment maintenance.	Greenwood County	Greenwood County Fire Coordinator	Ongoing	High	High	Structure and Wild Fire	General Funds

Goal 3: Develop partnerships with organizations within the community to compensate for limited resources and improve coordination.

Strategies

- A. Organize a team composed of organizations to assist with preparedness, mitigation, response and recovery activities.
- B. Partner with non-government and the business community to reduce the impacts of events.
- C. Response and short-term recovery functions will be coordinated.

Hazard Mitigation Plan

Greenwood County, SC

Action	Jurisdiction	Responsible Party	Time Frame	Priority	Feasibility	Hazards Addressed	Funding
Organize an Emergency Management Committee composed of government, non-government, private businesses and citizens to develop, implement and guide a County-wide Emergency Management Program.	Greenwood County	Greenwood County Emergency Management	Ongoing	High	High	All hazards	General Funds and Grants (Private and Government)
Partner with homeowners of repetitive loss properties to relocate, abandon, or demolish structure.	City of Greenwood and Greenwood County	Greenwood County Building Codes	As necessary	Moderate	Moderate	Floods	General Funds and Government Grants
Partner with utility companies to remove dead trees or trim large branches located near utilities.	City of Greenwood and Greenwood County	Greenwood County Emergency Management	Ongoing	High	High	Tropical Storms, severe storms, tornadoes, windstorms, winter/ice storms	Private Funds
Partner with businesses (Walmart, Covidien Healthcare, Duke Energy, SPF, etc) to improve response and recovery actions	City of Greenwood and Greenwood County	Greenwood County Emergency Management	Ongoing	Moderate	Moderate	All hazards	Private Grants and General Funds
Partner with community groups (Rotary, CERT, Red Cross, etc.) to meet identified needs within the community.	City of Greenwood and Greenwood County	Greenwood County Emergency Management	Ongoing	Moderate	Moderate	All hazards	Private and Government Grants and General Funds
Serve as a repository for dam failure plans.	Greenwood County	Greenwood County Emergency Management	Ongoing	Moderate	High	Dam failure	General Funds
Create a task force composed of fire fighters, Duke Energy, CPW and road department employees to clear roads after a storm	City of Greenwood and Greenwood County	Greenwood County Road Department	As necessary	High	Moderate	Tropical Storms, severe storms, tornadoes, windstorms, winter/ice storms	General and Private Funds

Accomplishments

Project: Update equipment at existing E-911 Communications Center as needed and as funding is available. Maintain the reverse E-911 system.

Priority: High **Feasibility:** Medium

Responsibility: Greenwood County EPD

Timeframe: 12/2014, On-going **Hazard Addressed:** All

Funding Source: General Fund, grant resources

Status Update: The equipment portion of this goal has been achieved recently, and it needs to be continued in the future. The press reverse E-911 has been created since the original plan was created.

Project: Research a more effective method of notifying the public of pending emergencies to reduce dependence on siren systems.

Priority: High **Feasibility:** Medium

Responsibility: Greenwood County EPD

Timeframe: 12/2014 **Hazard Addressed:** Tornado, Fire

Funding Source: Pre-Disaster Mitigation Program, General Fund

Status Update: New technology using cell phones and phone apps has made this possible.

Project: Regularly review local government comprehensive plans and ordinances to ensure that they include provisions for pre- and post-disaster planning.

Priority: High **Feasibility:** Low

Responsibility: Greenwood County EPD, Greenwood County, municipalities

Timeframe: 12/2014, On-going **Hazard Addressed:** All

Funding Source: General Fund**Status Update: This project has been accomplished.**

Project: Develop a plan to reach mobile home parks with pre- and post- disaster information.

Priority: High Feasibility: High**Responsibility: Greenwood County EPD, municipalities, Greenwood County****Timeframe: 12/2006 Hazard Addressed: All****Funding Source: Not Applicable****Status Update: This project has been accomplished with the use of new technology and cell phone apps.**

Project: Adequately support and enforce existing building code programs.

Priority: High Feasibility: High**Responsibility: Greenwood County EPD, Greenwood County, municipalities****Timeframe: 12/2006, On-going Hazard Addressed: All****Funding Source: Not applicable****Status Update: This project has been accomplished.**

Project: Research getting digital copies of flood plain and other hazard maps for the county.

Priority: Medium Feasibility: Medium**Responsibility: Greenwood County EPD****Timeframe: 12/2007 Hazard Addressed: All****Funding Source: Not Applicable****Status Update: This project has been accomplished.**

Project: When financially feasible, research potential software packages that would allow the development and printing of hazard related maps in Greenwood County.

Priority: Medium **Feasibility:** Medium
Responsibility: Greenwood County EPD
Timeframe: 12/2008 **Hazard Addressed:** All
Funding Source: Not Applicable
Status Update: This project has been accomplished.

XI. Plan Implementation and Maintenance Procedures

Maintenance

According to the Disaster Mitigation Act of 2000 local plans are required to develop a method and schedule of monitoring, evaluating, and updating the hazard mitigation plan within a five-year cycle. This cycle corresponds to the five-year updates required for comprehensive plans if the County decides to undertake one.

Monitoring

Using the implementation schedule developed for the mitigation projects, the Greenwood County Council in cooperation with Greenwood County Hazard Mitigation Planning Team shall meet on a regular basis to track the progress of the mitigation plan. Status reports shall be submitted to the County Commission by each of the strategy implementation agencies also on a yearly basis which detail efforts to date and any challenges they are experiencing in implementing the mitigation projects. The County Council and Greenwood County Hazard Mitigation Planning team will be responsible for tracking the progress of the implementing agencies and ensuring adherence to the plan time line.

The committee will review the following plans and technical information during the monitoring process: Greenwood County Hazard Mitigation Plan, Greenwood City/County Comprehensive Plan, City/County Zoning Ordinance, City/County Flood Plain Ordinance, weather reports from the National Oceanographic and Atmospheric Administration and various instructional materials from the Federal Emergency Management Agency. Relevant information from these documents was placed at the pertinent location in this updated plan. Each section of the plan will be monitored to determine relevance and accuracy.

The committee decided that they would take the entire existing plan and review it to start the update process. Members marked up the plan and brought, mailed, emailed, or discussed those proposed changes with the plan coordinator. The goal section was reviewed to determine which goals had been accomplished, which goals still needed to be accomplished, and which goals were no longer relevant. Updated Census information was used where available and appropriate to make the plan as relevant as possible. Storm and weather events since the last update were also included to determine if there are patterns that are affecting particular areas or populations. All this information was deemed important to having the most complete plan possible for the county.

The plan will be posted on the county website after approval for ongoing comment, and all plan update and maintenance meetings will be made public.

Evaluation

On an annual basis the County Council and the Greenwood County Hazard Mitigation Planning team will coordinate to develop an end-of year report. The report should detail mitigation activities undertaken over the course of the year as well as any mitigation projects that have been completed. Any mitigation success stories should be highlighted. The report should also address the following points:

- Evaluate the goals and objectives to ensure they address current and expected conditions;
- Determine if the nature or magnitude of risk has changed.
- Evaluate whether the current resources are adequate for implementing the plan.
- Document any implementation problems such as technical, political, legal, or coordination issues with other agencies.
- Discuss whether the outcomes have occurred as expected.
- Document agency and other partner participation.
- Document public participation opportunities.

Copies of the annual report will be made available to each of the implementing agencies, local governments, citizens, SC EMD and FEMA. In addition, to maintain public involvement during the plan monitoring and evaluation process, the public will be invited to attend all meetings of the Hazard Mitigation Planning Committee. During the meetings the public will be provided an opportunity to comment on the implementation and evaluation of the plan. The public will be notified of the meetings through public notices in *Greenwood Index Journal*.

Update

At a minimum, the plan will be updated every five years after the adoption date. In the event of a significant disaster or any substantial changes in land use planning or regulations that would impact the recommended mitigation projects, more frequent updates will be considered. The hazard mitigation planning committee as sub-part of the overall Emergency Management Committee will be responsible for overseeing the update of the hazard mitigation plan. The update process would be similar to the one used to develop the original plan and would incorporate opportunities for public involvement. The public will be asked to comment in general on mitigation needs of the community through public hearings advertised in the newspaper as well as on-line surveys and other means as they are determined. Then the public will have the opportunity to review the suggested changes, and public comments will be included in the final document.

Due to limited funding and significant turnover of key personnel on the previous Hazard Mitigation Committee as well as in the county government, there has not been a consistency in addressing natural hazard mitigation needs of the county in the past five years. The Greenwood County Emergency Management Director recognizes this as a weakness and is taking steps to reestablish the planning and annual evaluation process as described in this plan. A major goal of this plan is keeping this document updated through semi-annual meetings and reviews and not waiting until the end of five years to make updates. (See Goal 3, Strategy A, Action Item 1.)

Plan distribution list:

Greenwood County Manager
Greenwood City Manager

Mayor of Ninety Six
Mayor of Ware Shoals
Mayor of Hodges
Mayor of Troy
Superintendents of School Districts 50, 51, 52
Greenwood Commission of Public Works Director
Greenwood Metropolitan Sewer District Director
United Way of Greenwood and Abbeville County Director
Greenwood County Emergency Management Staff
Greenwood Index-Journal Press Contact
GwdToday.com Press contact

Critical Facilities List**Fire Departments**

City of Greenwood (3)
Northwest
Coronaca
Highway 34
Ware Shoals
Ninety Six
Lower Lake Greenwood

Epworth-Phoenix
Promised Land
Hodges-Cokesbury
Callison
Tri-County
Troy

Municipal Buildings

Greenwood City Hall/Police Department
Ninety Six Town Hall
Ware Shoals Town Hall

County Buildings

Courthouse
Law Enforcement Center
Library

Utilities

Commissioners of Public Works
Greenwood Metro

Schools

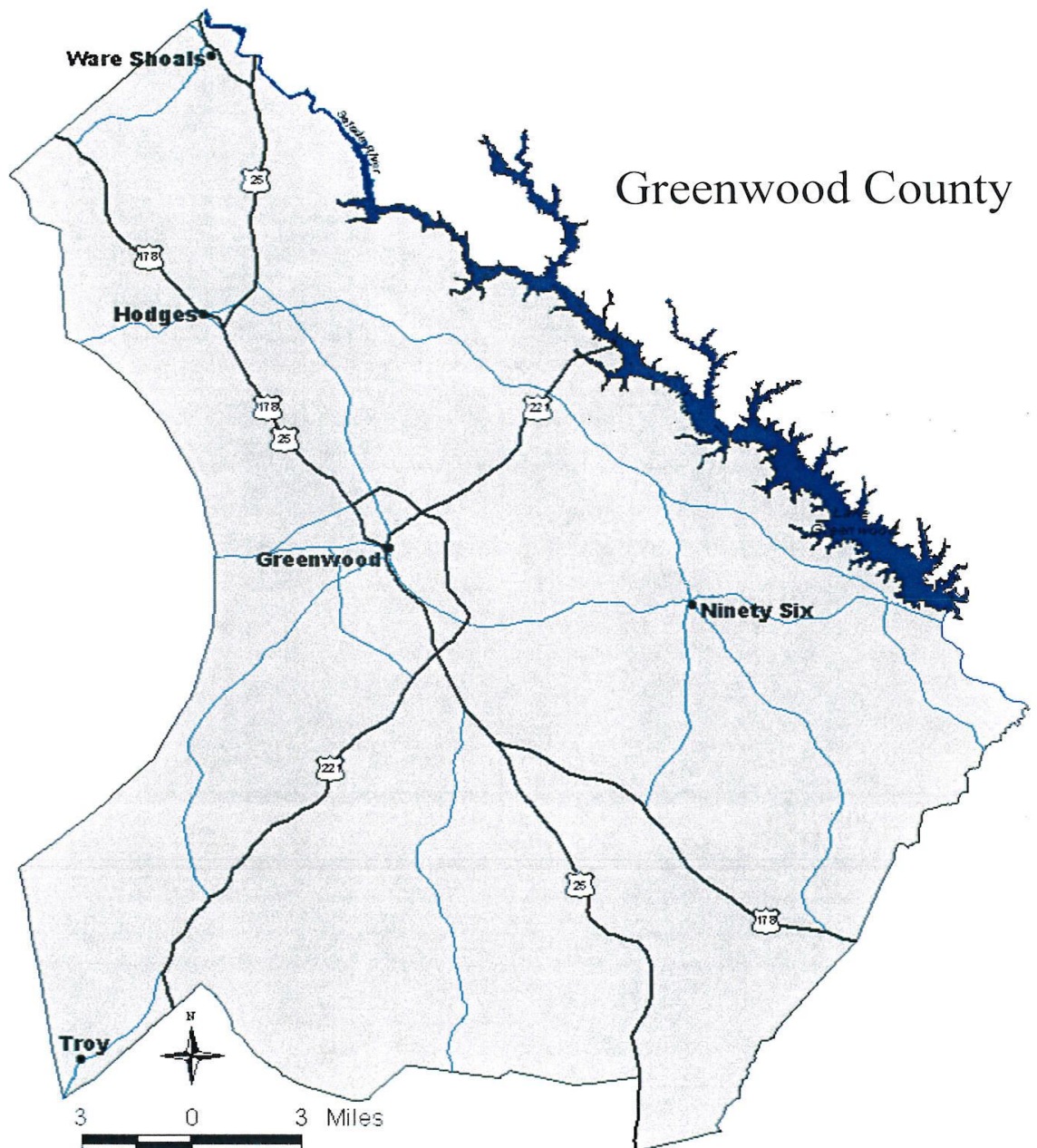
Greenwood High
Brewer Middle
Northside Middle
Westview Middle
Early Childhood Center
Hodges Elementary
Lakeview Elementary
Mathews Elementary

Merrywood Elementary
Rice Elementary
Pinecrest Elementary
Springfield Elementary
Woodfields Elementary
Emerald High
Genesis Education Center

Ware Shoals High
Ware Shoals Elementary
Ninety Six High
Edgewood Middle
Ninety Six Primary
Ninety Six Elementary
County Technology Center

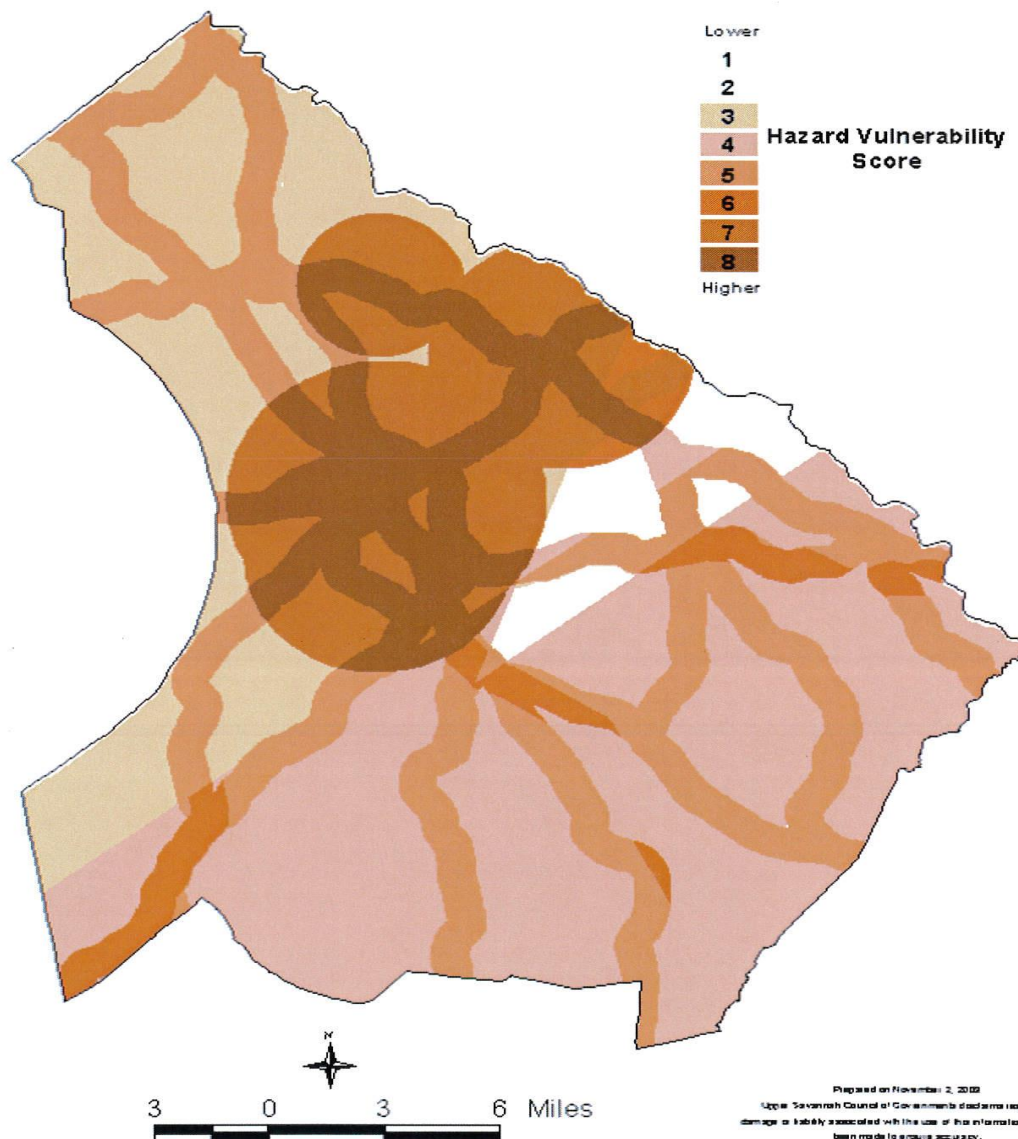
Self Regional Medical Center

ANNEX A: MAPS



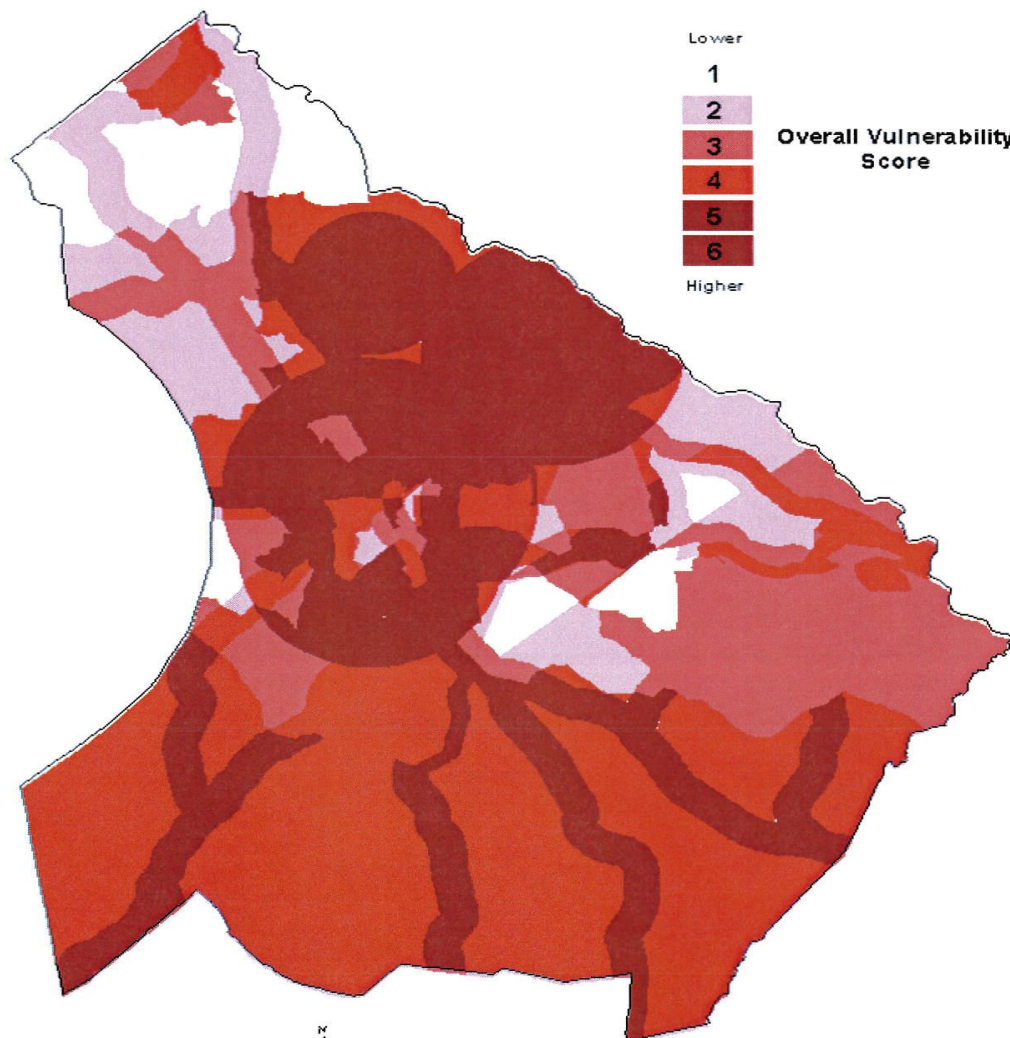


**Greenwood County, South Carolina
Mapped Composite Hazard Zones**

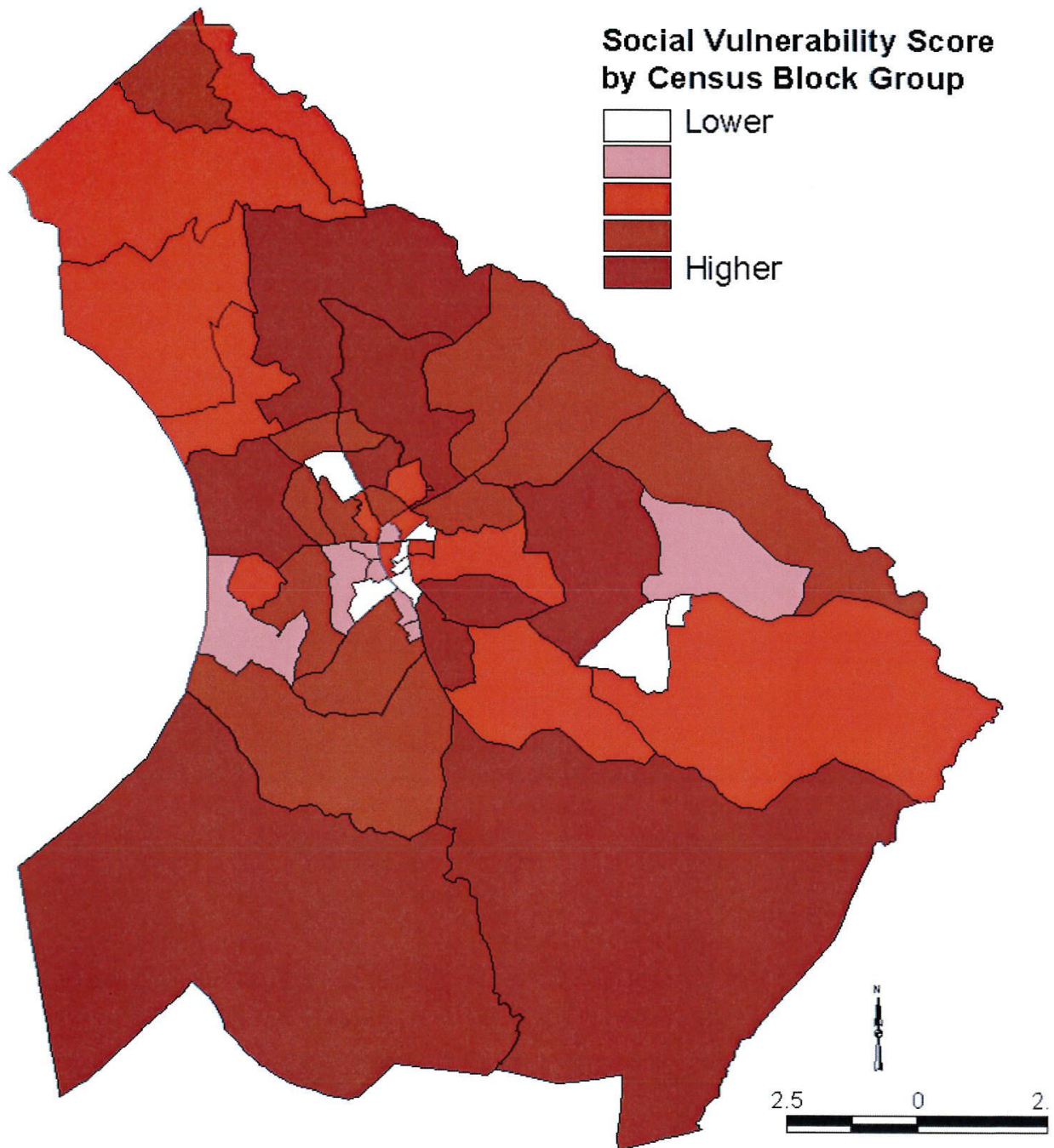




**Greenwood County, South Carolina
Overall Place Vulnerability**

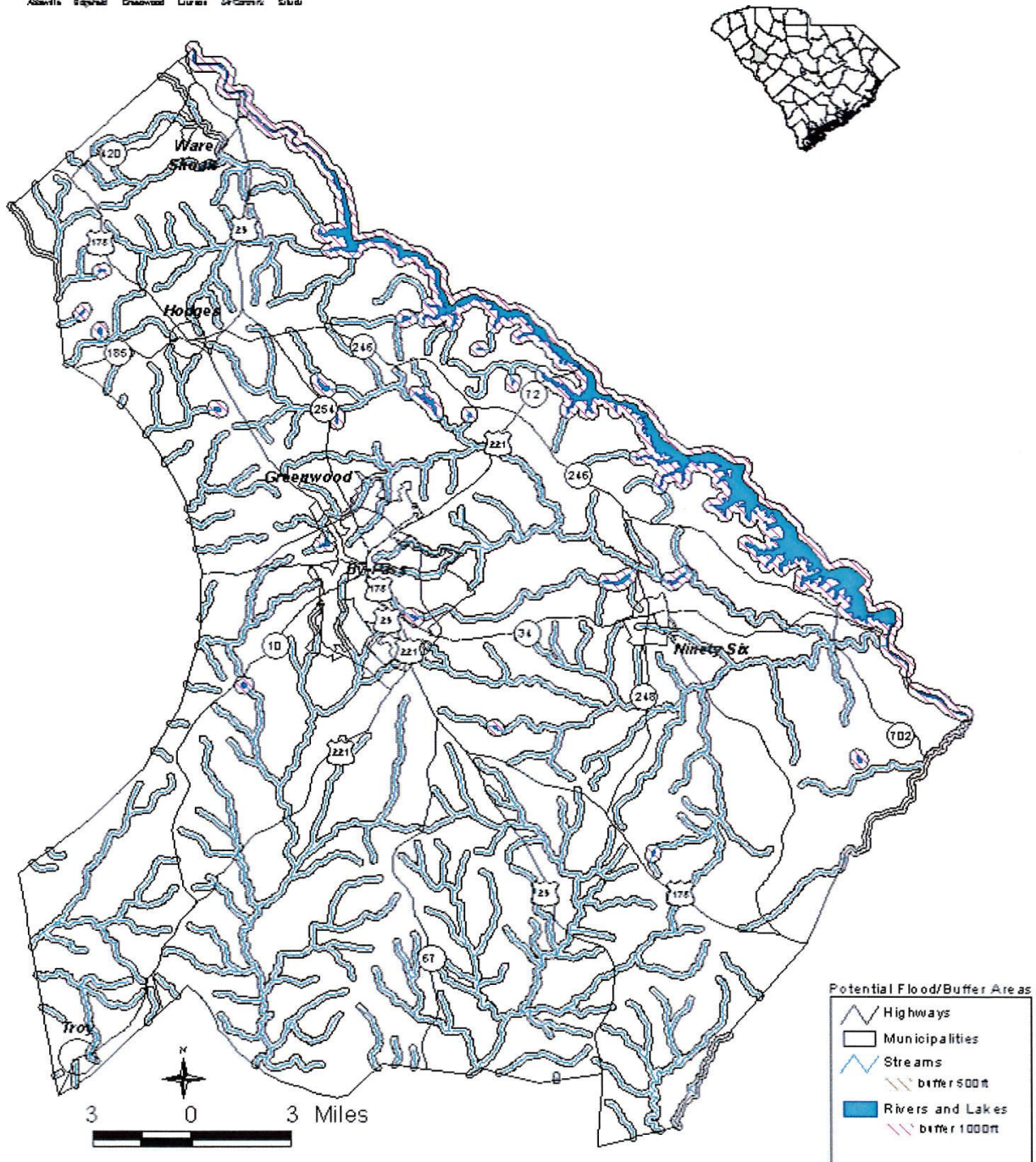


Prepared on November 2, 2009
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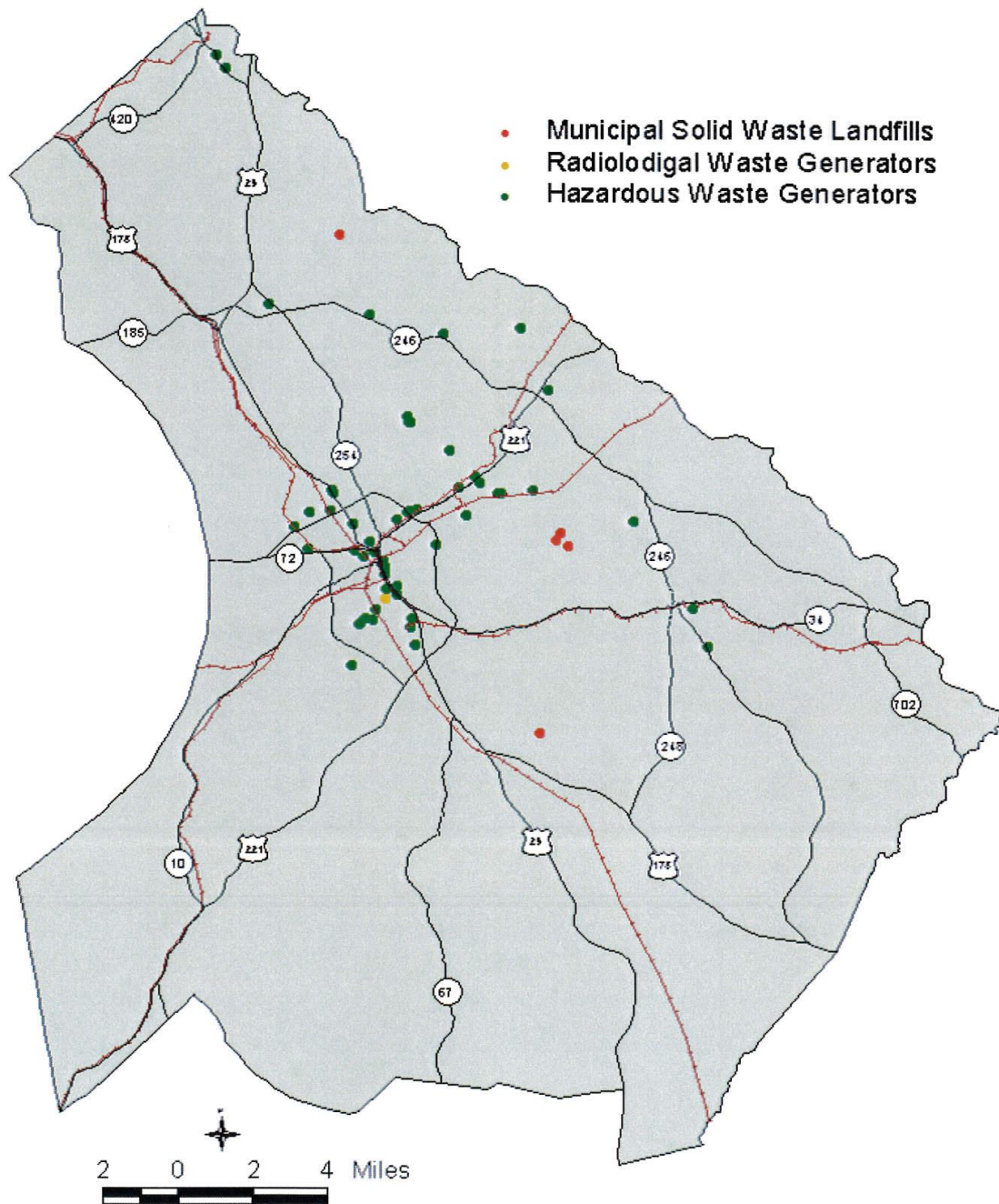




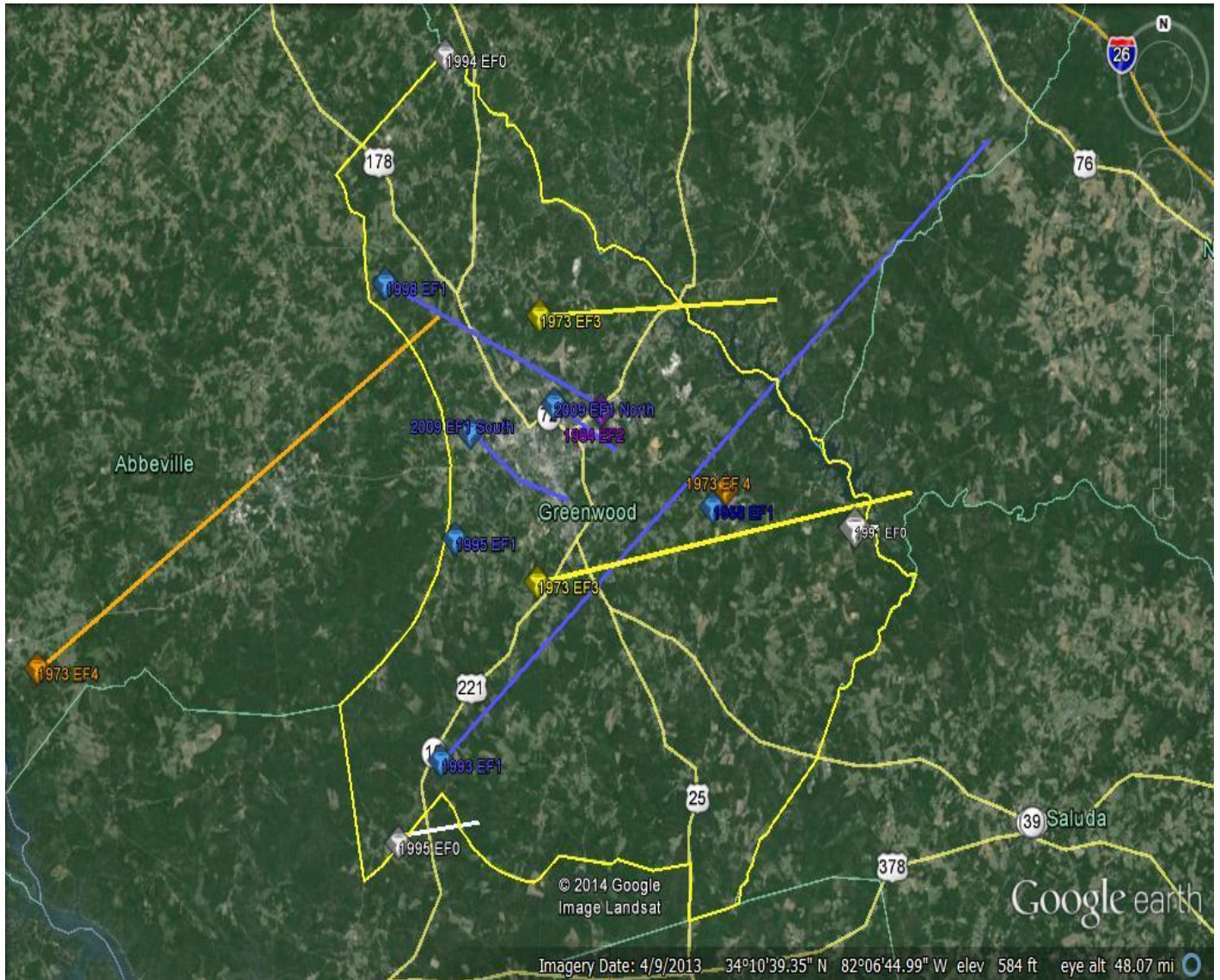
*Greenwood County, South Carolina
Potential Flood Areas*



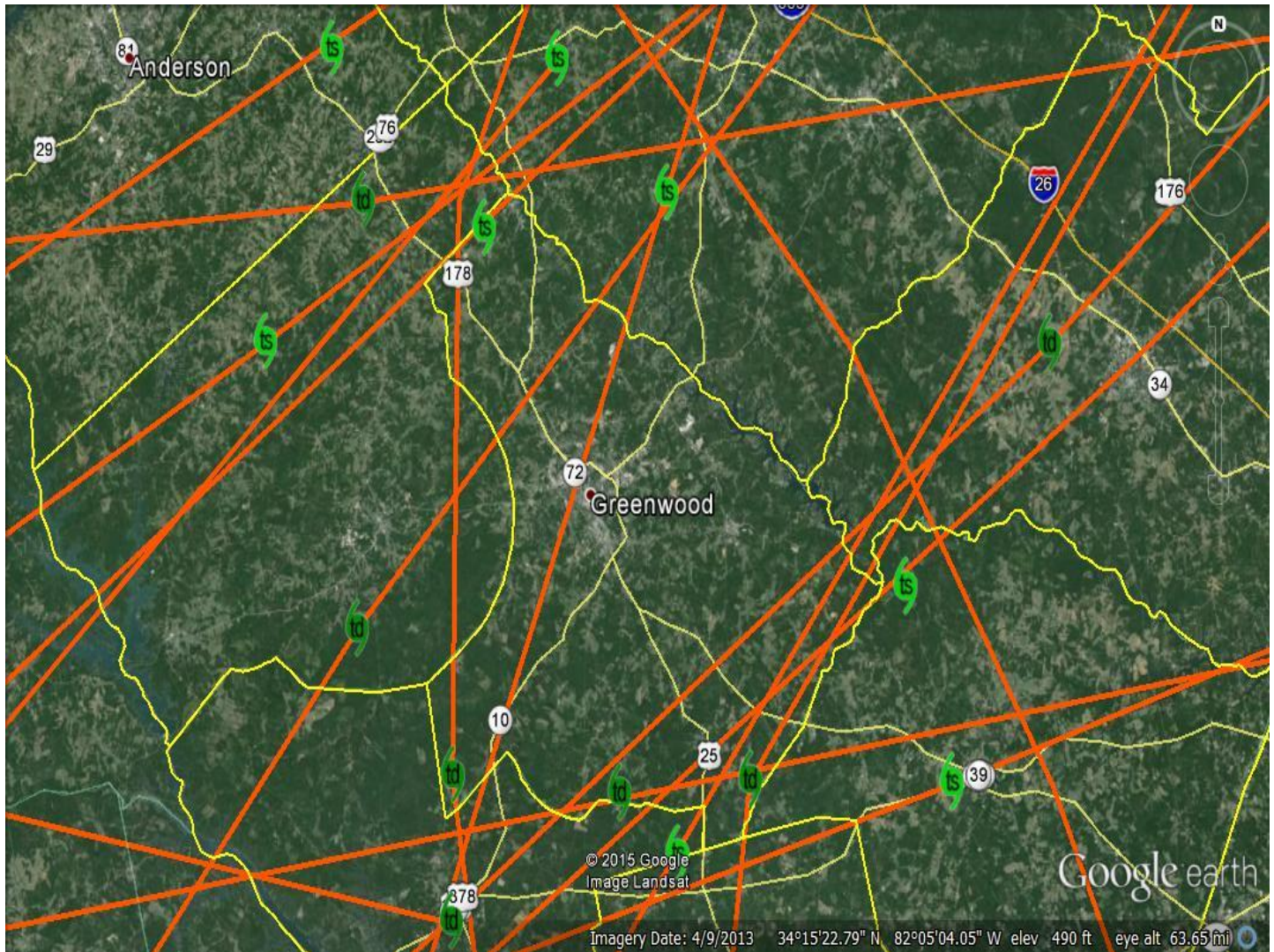
Prepared January 2003
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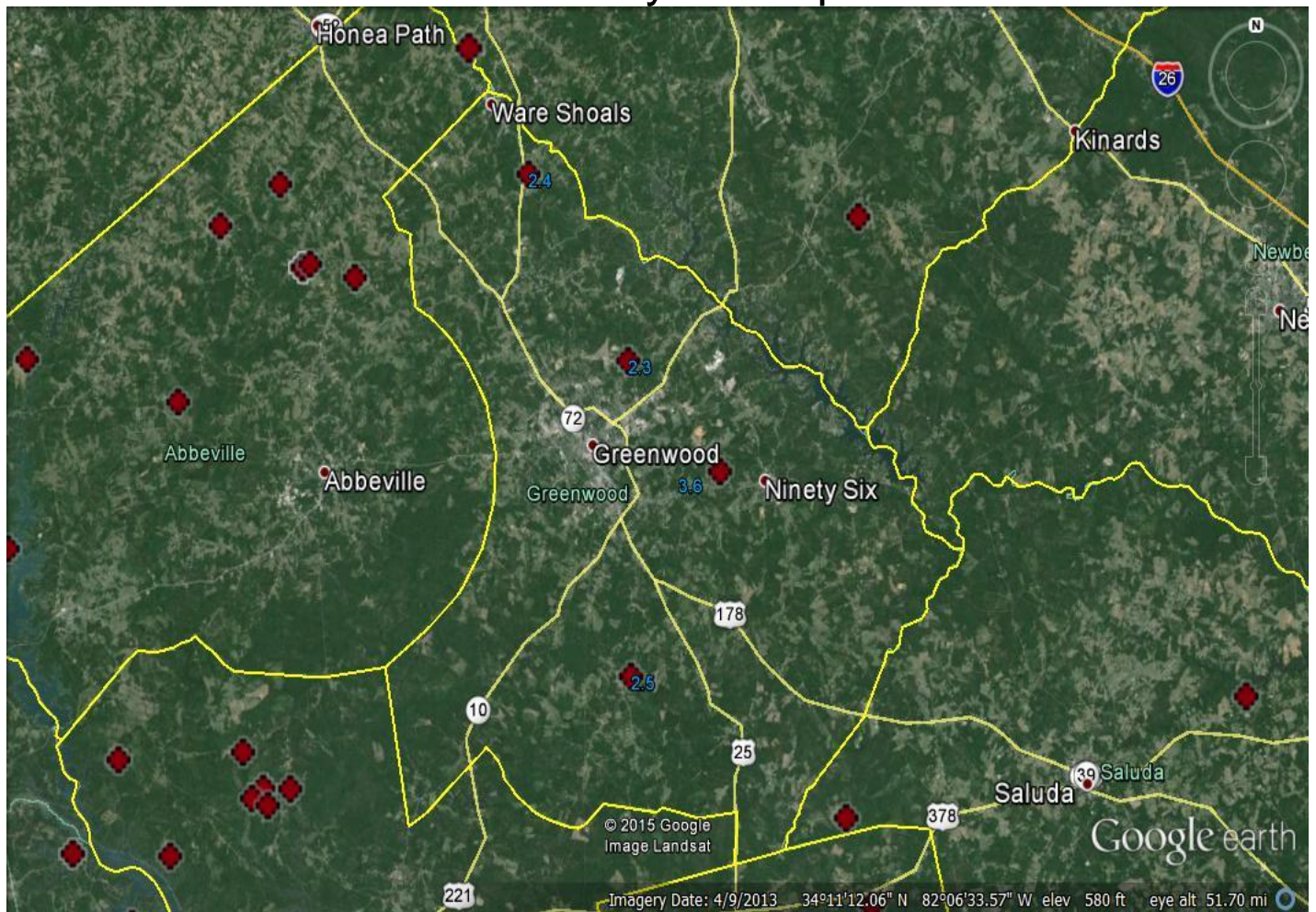
Greenwood County Tornadoes



Greenwood County Tropical Systems

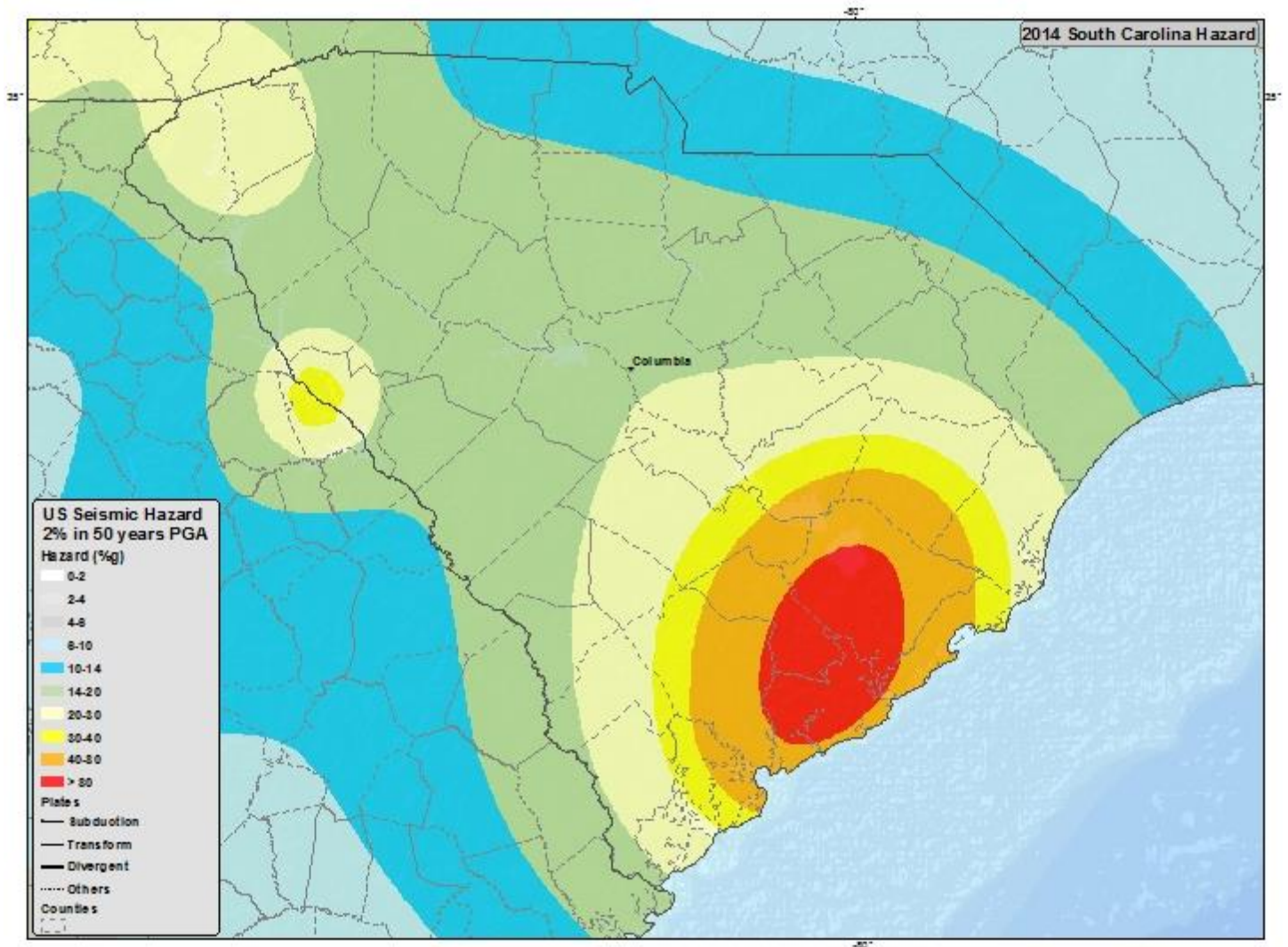


Greenwood County Earthquakes



South Carolina 2014 Seismic Hazard Data

USGS Earthquake Hazards Program



Meeting Information and Additional Weather Data

Meeting Information



Council of Governments

430 Helix Road
Greenwood, SC 29646

Telephone 864-941-8050
Toll-Free 1-800-922-7729
FAX 864-941-8090

Memorandum

To: Agencies with an interest in natural hazard mitigation planning for Greenwood County

From: Rick Green, Government Services Director

Date: August 21, 2014

Subject: Greenwood County Natural Hazard Mitigation Plan Update Initial Meeting

The Greenwood County Emergency Services Office and Upper Savannah Council of Governments are about to begin the process of updating the Natural Hazard Mitigation Plan for the county. This plan is a blueprint for reducing property damage and saving lives from the effects of future natural disasters. This plan is also required in order for Greenwood County and the municipalities to receive certain types of state and federal disaster relief funds after disasters occur.

There will be an initial meeting for the update of this plan on Tuesday, September 9 at 10:00 am in the board room at Upper Savannah Council of Governments. You are invited to attend this meeting and actively participate in the planning process. Greenwood County and each municipality will have the option of adopting this plan once updated. Adoption of the plan will mean that the local government is eligible to apply for disaster mitigation funds.

A sample page from the goals section of the plan is copied on the back of this memo for your information.

If you have any questions before the meeting, please call me at 941-8072. Thank you for your interest in this project, and I look forward to seeing you or your agency representative on September 9.

9 September 2014

Greenwood County Hazard Mitigation Planning Team
Sign-in Roster

Name	Department/Agency	Phone Number	Email	Signature
Wayne Daniel	GMD		Wdaniel@greenwoodmetro.com	
Tommy Folwer	Duke Energy		Tommy.Folwer@duke-energy.com	
David Garner	SCEMD	803-673-4530	dgarner@emd.sc.gov	<i>David Garner</i>
Rick Green	Upper Savannah COG	941 8072	rgreen@uppersavannah.com	<i>Rick Green</i>
Stephanie Hackett	DHEC	803-0333	hackettsa@dhec.sc.gov	<i>Stephanie Hackett</i>
Wally Hall	Ninety Six School District 52	864 943 2149	whall@greenwood52.org	<i>Wally Hall</i>
Steve Holmes	Greenwood County FC		sholmes@greenwoodsc.gov	<i>Steve Holmes</i>
Phil Lindler	Greenwood County Planner		plindler@greenwoodsc.gov	
Billy Lybrand	SCDOT		lybrandiw@scdot.org	
Derek Kinney	Greenwood County ES	377-1988	dkinney@greenwoodsc.gov	<i>Derek Kinney</i>
Denise Manley	United Way		dmanley@unitedwaygac.org	<i>Denise Manley</i>
Beth Maret	Red Cross		Beth.Maret@redcross.org	<i>Beth Maret</i>
George McKinney	Greenwood County EM	864 542-9558	gmckinney@greenwoodsc.gov	<i>George McKinney</i>
Ben Ross	DHEC	864 443 6367	rossbc@dhec.sc.gov	<i>Ben Ross</i>
Larry Smith	Greenwood County Engineer		lsmith@greenwoodsc.gov	<i>Larry Smith</i>
Fay Sprouse	Ware Shoals School District 51	864-554-3057	fsprouse@gwd51.org	<i>Fay Sprouse</i>
Julie Wilkie	City of Greenwood	942-8411	julie.wilkie@cityofgreenwoodsc.com	<i>Julie Wilkie</i>
Gerald Witt	Greenwood School District 50		wittg@gwd50.org	
Scot Yarbrough	SCEMD		vyarbrough@emd.sc.gov	<i>Scot Yarbrough</i>
<i>Thilo Lane</i>	<i>Duke Energy</i>	<i>864 420-0068</i>	<i>thilo.lane@duke-energy.com</i>	<i>Thilo Lane</i>
<i>David Hays</i>	<i>Upper Savannah COG</i>	<i>941 8064</i>	<i>dhays@uppersavannah.com</i>	<i>David Hays</i>

**Minutes
Greenwood County Hazard Mitigation Planning Committee
September 9, 2014**

The meeting began at 10am. George McKinney welcomed the group and gave a brief background report on the hazard mitigation planning process. The group was asked for comments on natural hazards and repetitive losses in Greenwood County.

Winter weather, tornadoes, and wildfires were mentioned as major threats to the county.

The Code Red Warning System was discussed and reviewed.

Generators were a need in each of the shelters and critical facilities in the County. Portable auxiliary lighting, submersible pumps, and debris removal equipment were mentioned as needs. Updating fire fighting equipment and apparatus are needed constantly.

The group discussed the various natural hazards for Greenwood County and how best to mitigate them. Information was distributed and discussion followed where a variety of mitigation goals and procedures were discussed.

Rick Green gave a brief timeline for the project. He mentioned that another public meeting would be held at the end of this process at a County Council meeting.

Greenwood County Hazard Mitigation Planning Committee Sign-in Roster

[illegible]

6 november 2014

Greenwood County Hazard Mitigation Planning Committee Sign-in Roster

[illegible]

ity his vehicle.

ed in armed murder case

nd Regional Hospital.

While at the hospital, the victim told the officer the suspects physically assaulted him and began shouting at him to "give it up," before shooting him. He said they took his money, \$1,000 in cash, and fled.

The officer saw what appeared to be a small caliber bullet hole in the victim's upper right bicep.

Jackson was charged two days after the incident.

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Mall
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Research Labs. For 29 years, he worked with Westinghouse Electric in the Pittsburgh area on nuclear power

transportation to children and adults in need of getting medical treatment at distant facilities.

■ YOUR INPUT

Greenwood County seeking views on Hazard Mitigation Plan update

From staff reports

Greenwood County is in the beginning stages of updating its Hazard Mitigation Plan as required by the Federal Emergency Management Association and is seeking the community's opinions.

Greenwood County Emergency Management Coordinator George McKinney met with representatives from different agencies Sept. 9 at the Upper Savannah Council of Governments, which is assisting Greenwood, as well as Abbeville, Edgefield, Laurens and McCormick counties with Hazard Mitigation Plan updates.

Greenwood County's current Hazard Mitigation Plan, which can be found on the Greenwood County government website's Emergency Management Department page, must be updated by March 2015.

The goal of the plan is to assist Greenwood County in reducing the human and economic costs of natural disasters. This plan provides a comprehensive risk assessment, vulnerability analysis, mitigation strategies and implementation schedule for the county and each of its municipalities.

For information, contact McKinney, 864-942-8553 or at gmckinney@greenwoodsc.gov.

**GREENWOOD
COUNTY FAIR**
**Sept 23 thru
Sept 27, 2014**
Hwy 221 225 South Greenwood, SC 29646

TUESDAY: GATES OPEN: 5 PM
Admission FREE Tuesday only - Ride all rides for \$15

WEDNESDAY: GATES OPEN 5 PM
Church Night: Admission \$2 with Church Bulletin

THURSDAY: GATES OPEN 5 PM
Tiger Show - Farm Show and Free Circus

FRIDAY: GATES OPEN 5 PM
Mud Bog at 7 PM. FREE with Gate Admission
Free Band 7 PM - 10 PM

SATURDAY: GATES OPEN 10 AM
SCHOOL DAY: Student Admission Free from 10 AM til 4 PM
Mud Bog at 3 PM. FREE with Gate Admission
Free Band 7 PM - 10 PM

FREE SHOWS EACH DAY
Tiger Show - Farm Show and Free Circus with Gate Admission
Bring this ad in on Saturday from 10-4pm and kids get in FREE

September 23, 2014



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Greenwood County Seeking Input on Hazard Mitigation Plan Update
Thanks for reading GwdToday - Everyday!

Greenwood County is in the beginning stages of updating its Hazard Mitigation Plan as required by the Federal Emergency Management Association (FEMA) and is seeking community input.

Greenwood County Emergency Management Coordinator George McKinney met with representatives from different agencies Sept. 9 at the Upper Savannah Council of Governments (USCOG), which is assisting Greenwood as well as Abbeville, Edgefield, Laurens and McCormick counties with Hazard Mitigation Plan updates.

"Counties are required to update their Hazard Mitigation Plans in order to qualify for FEMA emergency funds," USCOG Government Services Director Rick Green said. "The Plan must be updated every five years."

Greenwood County's current Hazard Mitigation Plan which can be found on the Greenwood County government website's Emergency Management Department page must be updated by March 2015.

Representatives from the S.C. Department of Health and Environmental Control (DHEC), the United Way, Red Cross, Duke Energy and school districts were among those attending the meeting.

The goal of the Plan is to assist Greenwood County in reducing the human and economic costs of natural disasters. This plan provides a comprehensive risk assessment, vulnerability analysis, mitigation strategies, and implementation schedule for the County and each of its municipalities.

Priority hazards for Greenwood County listed on its current plan include severe winter storms (focus on power outages from ice storms), drought, severe thunderstorms and lightning, tornadoes, wildfires, earthquakes, hail or wind storms, Hazmat incidents/transportation, structure fires, tropical storms and hurricanes, flooding and terrorism.

Greenwood County's hazard mitigation planning goals include protecting the health, safety and welfare of the community's residents and visitors from disasters, limiting the disruption of the community's infrastructure, protecting the community's economic vitality, limiting property damage, and producing better hazard data for local governments such as flood plain maps, hazardous materials surveys, etc.

McKinney told those attending the meeting about the importance of bringing agencies together "to talk about goals and objectives."

He promised to keep the agencies informed and that another meeting will be scheduled for the fall, possibly October.

For more information about the County's Hazard Mitigation efforts, contact McKinney at (864) 942-8553 or at gmcinney@greenwoodsc.gov.

PH

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Weather Data

Winter Weather		
Month	Year	Inches
January	1999	Ice
January	2000	4.02
January	2002	7.01
December	2002	Ice
January	2004	Ice
February	2004	Ice
December	2005	Ice
February	2007	Ice
December	2010	3.51
January	2011	7.01
February	2011	0.99
January	2014	1.62
February	2014	6.03
November	2014	2.52

Severe Weather			
Day	Month	Year	Information
23	May	2010	Wind (Trees downed)
15	June	2010	Wind (Trees downed)
25	June	2010	Wind (Trees downed)
29	June	2010	Wind (Trees downed)
11	July	2010	Wind (Trees downed)
26	July	2010	Wind (Trees downed)
6	August	2010	Wind (Trees downed)
28	February	2011	Wind (Trees downed)
4	April	2011	Wind (Trees downed) and Hail (1" dia.)
15	June	2011	Hail (1" - 2" diameter)
18	June	2011	Wind (Trees downed)
22	June	2011	Wind (Trees downed)

Severe Weather			
Day	Month	Year	Information
24	June	2011	Wind (Trees downed)
2	March	2012	Wind (Trees downed) Hail (1" - 1.5" diameter)
31	March	2012	Wind (Trees downed)
3	July	2012	Wind (Trees downed)
27	July	2012	Wind (Trees downed)
14	June	2013	Wind (Trees downed)
18	June	2013	Wind (Trees downed)
25	June	2013	Wind (Trees downed)
11	January	2014	Wind (Downed power lines and trees) Hail (1" - 1.25" diameter)
25	May	2014	Wind (Tree on Truck)
23	November	2014	Wind (Tree on Truck)

Weather Data Continued

Drought			Drought			Drought		
Month	Year	PDSI	Month	Year	PDSI	Month	Year	PDSI
April	2010	-1.32	November	2011	-3.76	June	2013	1.42
May	2010	-1.62	December	2011	-4.01	July	2013	3.20
June	2010	-2.15	January	2012	-4.32	August	2013	4.00
July	2010	-2.78	February	2012	-4.53	September	2013	3.43
August	2010	-2.50	March	2012	-5.05	October	2013	2.52
September	2010	-2.74	April	2012	-5.32	November	2013	2.40
October	2010	-2.85	May	2012	-4.91	December	2013	3.40
November	2010	-3.15	June	2012	-4.19	January	2014	0.01
December	2010	-3.60	July	2012	-3.89	February	2014	-0.25
January	2011	-4.02	August	2012	-2.95	March	2014	-0.32
February	2011	-4.13	September	2012	-3.04	April	2014	-0.35
March	2011	-3.32	October	2012	-3.30	May	2014	-0.20
April	2011	-3.34	November	2012	-3.41	June	2014	-0.42
May	2011	-3.35	December	2012	-2.93	July	2014	-0.95
June	2011	-3.33	January	2013	-3.10	August	2014	-1.44
July	2011	-3.81	February	2013	0.62	September	2014	-1.17
August	2011	-4.53	March	2013	0.63	October	2014	-1.45
September	2011	-4.37	April	2013	0.47	November	2014	0.65
October	2011	-4.08	May	2013	0.45	December	2014	0.75
						January	2015	0.00